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Date acc. to Dalla Torre & Harms. under Orulia 1873.

Also same date in Ind. Kew. under Orulia.

OUTLINES OF BOTANY

TO ACCOMPANY THE FLORA SYLVATICA.

From Mr. Bentham's 'Flora Australiensis.'

Chap. I. Definitions and Descriptive Botany.

1. The principal object of a **Flora** of a country is to afford the means of *determining* (*i. e.*, ascertaining the name of) any plant growing in it, whether for the purpose of ulterior study or of intellectual exercise.

2. With this view, a Flora consists of descriptions of all the wild or native plants contained in the country in question, so drawn up and arranged that the student may identify with the corresponding description any individual specimen which he may gather.

3. These descriptions should be *clear*, *concise*, *accurate*, and *characteristic*, so as that each one should be readily adapted to the plant it relates to, and to no other one; they should be as nearly as possible arranged under *natural* (184) divisions, so as to facilitate the comparison of each plant with those nearest allied to it; and they should be accompanied by an *artificial key* or index, by means of which the student may be guided step by step in the observation of such peculiarities or *characters* in his plant, as may lead him, with the least delay, to the individual description belonging to it.

4. For descriptions to be clear and readily intelligible, they should be expressed as much as possible in ordinary well-established language. But, for the purpose of accuracy, it is necessary not only to give a more precise technical meaning to many terms used more or less vaguely in common conversation, but also to introduce purely technical names for such parts of plants or forms as are of little importance except to the botanist. In the present chapter it is proposed to define such *technical* or *technically limited* terms as are made use of in these Floras.

5. At the same time mathematical accuracy must not be expected. The forms and appearances assumed by plants and their parts are infinite. Names cannot be invented for all; those even that have been proposed are too numerous for ordinary memories. Many are derived from supposed resemblances to well-known forms or objects. These resemblances are differently appreciated by different persons, and the same term is not only differently applied by two different botanists, but it frequently happens that the same writer is led on different occasions to give somewhat different meanings to the same word. The botanist's endeavours should always be, on the one hand, to make as near an approach to precision as circumstances will allow; and on the other hand, to avoid that prolixity of detail and overloading with technical terms which tends rather to confusion than clearness. In this he will be more or less successful. The aptness of a botanical description, like the beauty of a work of imagination, will always vary with the style and genius of the author.

§ 1. *The Plant in General.*

6. The **Plant**, in its botanical sense, includes every being which has *vegetable life*, from the loftiest tree which adorns our landscapes, to the humblest moss which grows on its stem, to the mould or fungus which attacks our provisions, or the green scum that floats on our ponds.

7. Every portion of a plant which has a distinct part or *function* to perform in the operations or phenomena of vegetable life is called an **Organ**.

8. What constitutes *vegetable life*, and what are the functions of each organ, belong to *Vegetable Physiolgy;* the microscopical structure of the tissues composing the organs, to *Vegetable Anatomy;* the composition of the substances of which they are formed, to *Vegetable Chemistry;* under *Descriptive and Systematic Botany* we have chiefly to consider the forms of organs, that is, their *Morphology*, in the proper sense of the term, and their general structure, so far as it affects classification and specific resemblances and differences. The terms we shall now define belong chiefly to the latter branch of Botany, as being that which is essential for the investigation of the Flora of a country. We shall add, however, a short chapter on Vegetable Anatomy and Physiology, as a general knowledge of both imparts an additional interest to and facilitates the comparison of the characters and affinities of the plants examined.

9. In the more perfect plants their organs are comprised in the general terms **Root, Stem, Leaves, Flowers,** and **Fruit.** Of these the three first, whose function is to assist in the growth of the plant, are *Organs of Vegetation;* the flower and fruit, whose office is the formation of the seed, are the *Organs of Reproduction.*

10. All these organs exist, in one shape or another, at some period of the life of most, if not all, *flowering plants*, technically called *phænogamous* or *phanerogamous plants*: which all bear some kind of flower and fruit in the botanical sense of the term. In the lower classes, the ferns, mosses, fungi, moulds or mildews, seaweeds, etc., called by botanists *cryptogamous plants*, the flowers, the fruit, and not unfrequently one or more of the organs of vegetation, are either wanting, or replaced by organs so different as to be hardly capable of bearing the same name.

11. The observations comprised in the following pages refer exclusively to the flowering or phænogamous plants. The study of the cryptogamous classes has now become so complicated as to form almost a separate Science. They are therefore not included in these introductory observations, nor with the exception of ferns and their allies, in the present Flora.

12. **Plants** are

Monocarpic, if they die after one flowering season. These include *Annuals*, which flower in the same year in which they are raised from seed; and *Biennials*, which only flower in the year following that in which they are sown.

Caulocarpic, if, after flowering, the whole or part of the plant lives through the winter and produces fresh flowers another season. These include *Herbaceous perennials*, in which the greater part of the plant dies after flowering, leaving only a small perennial portion called the Stock or Caudex close to or within the earth; *Undershrubs*, *suffruticose suffrutescent* plants, in which the flowering branches, forming a considerable portion of the plant,

die down after flowering, but leave a more or less prominent perennial and woody base; *Shrubs (frutescent* or *fruticose plants)*, in which the perennial woody part forms the greater part of the plant, but branches near the base, and does not much exceed a man's height; and *Trees (arboreous* or *arborescent plants)* when the height is greater and forms a woody *trunk*, scarcely branching from the base. *Bushes* are low, much branched shrubs.

13. The terms *Monocarpic* and *Caulocarpic* are but little used, but the other distinctions enumerated above are universally attended to, although more useful to the gardener than to the botanist, who cannot always assign to them any precise character. Monocarpic plants, which require more than two or three years to produce their flowers, will often, under certain circumstances, become herbaceous perennials, and are generally confounded with them. Truly perennial herbs will often commence flowering the first year, and have then all the appearance of annuals. Many tall shrubs and trees lose annually their flowering branches like undershrubs. And the same botanical species may be an annual or a perennial, a herbaceous perennial or an under shrub, an under shrub or a shrub, a shrub or a tree, according to climate, treatment, or variety.

14. Plants are usually *terrestrial*, that is, growing on earth, or *aquatic, i. e.*, growing in water; but sometimes they may be found attached by their roots to other plants, in which case they are *epiphytes;* when simply growing upon other plants without penetrating into their tissue, *parasites* when their roots penetrate into and derive more or less nutriment from the plant to which they are attached.

15. The simplest form of the perfect plant, the annual, consists of—

(1) The **Root**, or descending axis, which grows downwards from the stem, divides and spreads in the earth or water, and absorbs food for the plant through the extremities of its branches.

(2) The **Stem**, or ascending axis, which grows upwards from the root, branches and bears first one or more leaves in succession, then one or more flowers, and finally one or more fruits. It contains the tissues or other channels (217) by which the nutriment absorbed by the roots is conveyed in the form of *sap* (192) to the leaves or other points of the surface of the plant, to be *elaborated* or *digested* (218), and afterwards redistributed over different parts of the plant for its support and growth.

(3) The **Leaves**, usually flat, green, and horizontal, are variously arranged on the stem and its branches. They *elaborate* or *digest* (218) the nutriment brought to them through the stem, absorb carbonic acid gas from the air, exhaling the superfluous oxygen, and returning the assimilated sap to the stem.

(4) The **Flowers**, usually placed at or towards the extremities of the branches. They are destined to form the future seed. When perfect and complete they consist: 1st, of a *pistil* in the centre, consisting of one or more *carpels*, each containing the germ of one or more seeds; 2nd, of one or more *stamens* outside the pistil, whose action is necessary to *fertilize* the pistil or enable it to ripen its seed; 3rd, of a *perianth* or *floral envelope*, which usually encloses the stamens and pistil when young, and expands and exposes them to view when fully formed. This complete perianth is double; the outer one, called *Calyx*, is usually more green and leaf like; the inner one called the *Corolla*, more conspicuous, and variously colored. It is the perianth, and especially the corolla, as the most showy part, that is generally called the flower in popular language.

(5) The **Fruit**, consisting of the pistil or its lower portion, which persists or remains attached to the plant after the remainder of the flower has withered and fallen off. It enlarges and alters more or less in shape or consistence, becomes a *seed-vessel*, enclosing the seed until it is ripe, when it either opens to discharge the seed or falls to the ground with the seed. In popular language the term *fruit* is often limited to such seed-vessels as are or look juicy and eatable. Botanists give that name to all seed-vessels.

16. The herbaceous perennial resembles the annual during the first year of its growth; but it also forms (usually towards the close of the season), on its *stock* (the portion of the stem and root which does not die), one or more *buds*, either exposed, and then popularly called *eyes* or concealed among leaves. These buds, called *leaf-buds*, to distinguish them from *flower-buds* or unopened flowers are future branches as yet undeveloped; they remain dormant through the winter, and the following spring grow out into new stems bearing leaves and flowers like those of the preceding year, whilst the lower part of the stock emits fresh roots to replace those which had perished at the same time as the stems.

17. Shrubs and trees form similar leaf-buds either at the extremity of their branches, or along the branches of the ear. In the latter case these buds are usually *axillary*, that is, they appear in the *axil* of each leaf, i. e. in the angle formed by the leaf and the branch. When they appear at any other part of the plant, they are called *adventitious*. If these buds by producing roots (19) become distinct plants before separating from the parent, or if adventitious leaf-buds are produced in the place of flowers or seeds, the plant is said to be *viviparous* or *proliferous*.

§ 2. *The Root.*

18. **Roots** ordinarily produce neither buds, leaves, nor flowers. Their branches, called *fibres*, when slender and long proceed irregularly from any part of their surface.

19. Although roots proceed usually from the base of the stem or stock, they may also be produced from the base of any bud, especially if the bud lie along the ground, or is otherwise placed by nature or art in circumstances favourable for their development, or indeed occasionally from almost any part of the plant. They are then often distingushed as *adventitious*, and this term is by some applied to all roots which are not in prolongation of the original radicle.

20. **Roots** are

fibrous, when they consist chiefly of slender fibres.

tuberous, when either the main root or its branches are thickened into one or more short fleshy or woody masses called *tubers* (25).

taproots, when the main root descends perpendicularly into the earth, emitting only very small fibrous branches.

21. The stock of a herbaceous perennial, or the lower part of the stem of an annual or perennial, or the lowest branches of a plant, are sometimes underground and assume the appearance of a root. They then take the name of *rhizome*. The rhizome may always be distinguished from the true root by the presence or production of one or more buds, or leaves, or scales.

§ 3. *The Stock.*

22. The **Stock** of a herbaceous perennial, in its most complete state, includes a small portion of the summits of the previous year's roots, as well as of the base of the previous year's stems. Such stocks will increase yearly, so as at length to form dense tufts. They will often preserve through the winter a few leaves, amongst which are placed the buds which grow out into stems the following year, whilst the under side of the stock emits new roots from or amongst the remains of the old ones. These perennial stocks only differ from the permanent base of an undershrub in the shortness of the perennial part of the stems and in the texture usually less woody.

23. In some perennials, however, the stock consists merely of a branch, which proceeds in autumn from the base of the stem either above ground or underground, and produces one or more buds. This branch, or a portion of it, alone survives the winter. In the following year its buds produce the new stem and roots, whilst the rest of the plant, even the branch on which these buds were formed, has died away. These *annual stocks*, called sometimes

hybernacula, *offsets*, or *stolons*, keep up the communication between the annual stem and root of one year and those of the following year, thus forming altogether a perennial plant.

24. The stock, whether annual or perennial, is often entirely underground or root-like. This is the *root-stock*, to which some botanists limit the meaning of the term *rhizome*. When the stock is entirely root-like, it is popularly called the *crown* of the root.

25. The term *tuber* is applied to a short, thick, more or less succulent rootstock or rhizome, as well as to a root of that shape (20), although some botanists propose to restrict its meaning to the one or to the other. An Orchis tuber, called by some a *knob*, is an annual tuberous rootstock with one bud at the top. A potato is an annual tuberous rootstock with several buds.

26. A *bulb* is a stock of a shape approaching to globular, usually rather conical above and flattened underneath, in which the bud or buds are concealed, or nearly so, under *scales*. These scales are the more or less thickened bases of the decayed leaves of the preceding year, or of the undeveloped leaves of the future year, or of both. Bulbs are annual or perennial, usually underground or close to the ground, but occasionally buds in the axils of the upper leaves become transformed into bulbs. Bulbs are said to be *scaly* when their scales are thick and loosely imbricated, *tunicated* when the scales are thinner, broader, and closely rolled round each other in concentric layers.

27. A *corm* is a tuberous rootstock, usually annual, shaped like a bulb, but in which the bud or buds are not covered by scales, or of which the scales are very thin and membranous.

§ 4. *The Stem.*

28. **Stems** are

erect, when they ascend perpendicularly from the root or stock; *twiggy* or *virgate*, when at the same time they are slender, stiff, and scarcely branched.

sarmentose, when the branches of a woody stem are long and weak, although scarcely climbing.

decumbent or *ascending*, when they spread horizontally, or nearly so, at the base, and then turn upwards and become erect.

procumbent, when they spread along the ground the whole or the greater portion of their length; *diffuse*, when at the same time very much and rather loosely branched.

prostrate, when they lie still closer to the ground.

creeping, when they emit roots at their nodes. This term is also frequently applied to any rhizomes or roots which spread horizontally.

tufted cæspitose, when very short, close, and many together from the same stock.

29. Weak climbing stems are said to *twine*, when they support themselves by winding spirally round any object; such stems are also called *voluble*. When they simply climb without twining, they support themselves by their leaves, or by special clasping organs called *tendrils* (169), or sometimes like the Ivy, by small root-like excrescences.

30. *Suckers* are young plants formed at the end of creeping, underground rootstocks. *Scions*, *runners*, and *stolons*, or *stoles*, are names given to young plants formed at the end or at the nodes (31) of branches or stocks creeping wholly or partially above ground, or sometimes to the creeping stocks themselves.

31. A *node* is a point of the stem or its branches at which one or more leaves, branches, or leaf buds (16) are given off. An *internode* is the portion of the stem comprised between two nodes.

32. **Branches** or **Leaves** are

opposite, when two proceed from the same node, or opposite sides of the stem:

whorled or *verticillate* (in a *whorl* or *verticil*), when several proceed from the same node, arranged regularly round the stem; *geminate*, *ternate*, *fascicled*, or *fasciculate* when two, three, or more proceed from the same node on the same side of the stem. A tuft of fasciculate leaves is usually in fact a leafy branch, so short that the leaves appear to proceed all from the same point.

alternate, when one only proceeds from each node, one on one side and the next above or below, though usually not in the same vertical line.

decussate, when opposite, but each pair placed at right-angles to the next pair above or below it; *distichous*, when regularly arranged one above another in two opposite rows, one on each side of the stem; *tristichous*, when in three rows, etc. (92).

scattered, when irregularly arranged round the stem; frequently, however, botanists apply the term *alternate* to all branches or leaves that are neither opposite nor whorled.

secund, when all start from or are turned to one side of the stem.

33. **Branches** are *dichotomous* when several times forked, the two branches of each fork being nearly equal; *trichotomous*, when there are three nearly equal branches at each division instead of two; but when the middle branch is evidently the principal one, the stem is usually said to have two opposite branches; *umbellate*, when divided in the same manner into several nearly equal branches proceeding from the same point. If however the central branch is larger than the two or more lateral ones, the stem is said to have opposite or whorled branches, as the case may be.

34. A *culm* is a name sometimes given to the stem of Grasses, Sedges, and some other Monocotyledonous plants.

§ 5. *The Leaves.*

35. The ordinary or perfect **Leaf** consists of a flat *blade* or *lamina*, usually green, and more or less horizontal, attached to the stem by a stalk called a *footstalk* or *petiole*. When the form or dimensions of a leaf are spoken of, it is generally the blade that is meant, without the petiole or stalk.

36. The end by which a leaf, a part of the flower, a seed, or any other organ, is attached to the stem or other organ, is called its *base*, the opposite end is its *apex* or summit, excepting sometimes in the case of anther-cells (115.)

37. **Leaves** are

sessile, when the blade rests on the stem without the intervention of a petiole.

amplexicaul or *stem-clasping*, when the sessile base of the blade clasps the stem horizontally.

perfoliate, when the base of the blade not only clasps the stem, but closes round it on the opposite side, so that the stem appears to pierce through the blade.

decurrent, when the edges of the leaf are continued down the stem so as to form raised lines or narrow appendages, called *wings*.

sheathing, when the base of the blade, or of the more or less expanded petiole, forms a vertical sheath round the stem for some distance above the node.

38. Leaves and flowers are called *radical*, when inserted on a rhizome or stock, or so close to the base of the stem as to appear to proceed from the root, rhizome, or stock, *cauline* when inserted on a distinct stem. Radical leaves are *rosulate* when they spread in a circle on the ground,

39. **Leaves** are

simple and *entire*, when the blade consists of a single piece, with the margin nowhere indented, *simple* being used in opposition to *compound*, *entire* in opposition to *dentate*, *lobed*, or *divided*.

ciliate, when bordered with thick hairs or fine hair-like teeth.

dentate or *toothed*, when the margin is only cut a little way in, into what have been compared to teeth. Such leaves are *serrate*, when the teeth are regular and pointed like the teeth of a saw; *crenate*, when regular and blunt or rounded (compared to the battlement of a tower; *serrulate*, and *crenulate*, when the serratures or crenatures are small; *sinuate*, when the teeth are broad, not deep, and irregular (compared to bays of the coast); *wavy* or *undulate*, when the edges are not flat, but bent up and down (compared to the waves of the sea).

lobed or *cleft*, when more deeply indented or divided, but so that the incisions do not reach the midrib or petiole. The portions thus divided take the name of *lobes*. When the lobes are narrow and very irregular, the leaves are said to be *laciniate*. The spaces betwen the teeth or lobes are called *sinuses*.

divided or *dessected*, when the incisions reach the midrib or petiole, but the parts so divided off, called *segments*, do not separate from the petiole, even when the leaf falls, without tearing.

compound, when divided to the midrib or petiole, and the parts so divided off, called *leaflets*, separate, at least at the fall of the leaf, from the petiole, as the whole leaf does from the stem, without tearing. The common stalk upon which the leaflets are inserted is called the *common petiole* or the *rhachis*; the separate stalk of each leaflet is a *petiolule*.

40. Leaves are more or less marked by *veins*, which, starting from the stalk, diverge or branch as the blade widens, and spread all over it more or less visibly. The principal ones, when prominent, are often called *ribs* or *nerves*, the smaller branches only then retaining the name of *veins*, or the latter are termed *veinlets*. The smaller veins are often connected together like the meshes of a net, they are then said to *anastomose*, and the leaf is said to be *reticulate* or *net-veined*. When one principal vein runs direct from the stalk towards the summit of the leaf, it is called the *midrib*. When several start from the stalk, diverge slightly without branching, and converge again towards the summit, they are said to be *parallel* although not mathematically so. When 3 or 5 or more ribs or nerves diverge *from the base*, the leaf is said to be 3-*nerved*, 5-*nerved*, etc., but if the lateral ones diverge from the midrib a little above the base, the leaf is *tripli-nerved*, *quintupli-nerved*, etc. The arrangement of the veins of a leaf is called their *venation*.

41. The **Leaflets**, **Segments**, **Lobes** or **Veins** of leaves are

pinnate (feathered), when there are several succeeding each other on each side of the midrib or petiole, compared to the branches of a feather. A pinnately lobed or divided leaf is called *lyrate* when the terminal lobe or segment is much larger and broader than the lateral ones, compared by a stretch of imagination, to a lyre; *runcinate*, when the lateral lobes are curved backwards towards the base of the leaf; *pectinate*, when the lateral lobes are numerous, narrow, and regular, like the teeth of a comb.

palmate or *digitate*, when several diverge from the same point, compared to the figures of the hand.

ternate, when three only start from the same point, in which case the distinction between the palmate and pinnate arrangement often ceases or can only be determined by analogy with allied plants. A leaf with ternate lobes is called *trifid*. A leaf with three leaflets is sometimes improperly a ternate leaf: it is the leaflets that are ternate; the whole leaf is *trifoliolate*. Ternate leaves are leaves growing three together.

pedate, when the division is at first ternate, but the two outer branches are forked, the outer ones of each fork again forked, and so on, and all the branches are near together at the base, compared vaguely to the foot of a bird.

42. Leaves with pinnate, palmate, pedate, etc. leaflets, are usually for shortness called *pinnate*, *palmate*, *pedate*, etc. *leaves*. If they are so cut into segments only, they are usually said to be *pinnatisect*, *palmatisect*, *pedatisect*, etc., although the distinction between segments and leaflets is often unheeded in descriptions, and cannot indeed always be ascertained. If the leaves are so cut only into lobes, they are said to be *pinnatifid*, *palmatifid*, *pedatifid*, etc.

43. The teeth, lobes, segments, or leaflets may be again toothed, lobed, divided, or compounded. Some leaves are even three or more times divided or compounded. In the latter case they are termed *decompound*. When twice or thrice pinnate (*bipinnate* or *tripinnate*), each primary or secondary division, with the leaflets it comprises, is called a *pinna*. When the pinna of a leaf or the leaflets of a pinna are in pairs, without an odd terminal pinna or leaflet, the leaf or pinna so divided is said to be *abruptly pinnate*; if there is an odd terminal pinna or leaflet, the leaf or pinna is *unequally pinnate* (*imparipinnatum*).

44. The number of leaves or their parts is expressed adjectively by the following numerals, derived from the Latin:

uni-, bi-, tri-, quadri-, quinque-, sex-, septem-, octo-, novem-, decem-, multi-
1-, 2-, 3-, 4-, 5-, 6-, 7-, 8-, 9-, 10-, *many*-

prefixed to a termination, indicating the particular kind of part referred to. Thus—

unidentate, *bidentate*, *multidentate*, mean one toothed, two toothed, many toothed, etc.

bifid, *trifid*, *multifid*, mean two lobed, three lobed, many lobed, etc.

unifoliolate, *bifoliolate*, *multifoliolate*, mean having one leaflet, two leaflets, many leaflets, etc.

unifoliate, *bifoliate*, *multifoliate*, mean having one leaf, two leaves, many leaves, etc.

biternate and *triternate*, mean twice or thrice ternately divided.

unijugate, *bijugate*, *multijugate*, etc. pinnæ or leaflets, mean that they are in one, two, many, etc. pairs (*juga*).

45. **Leaves** or their parts, when **flat**, or any other flat organs in plants, are

linear, when long and narrow, at least four or five times as long as broad, falsely compared to a mathematical line, for a linear leaf has always a perceptible breadth.

lanceolate, when about three or more times as long as broad, broadest below the middle, and tapering towards the summit, compared to the head of a lance.

cuneate, when broadest above the middle, and tapering towards the base, compared to a wedge with the point downwards; when very broadly cuneate and rounded at the top, it is often called *flabelliform* or *fan-shaped*.

spathulate, when the broad part near the top is short, and the narrow tapering part long, compared to a spathula or flat ladle.

ovate, when scarcely twice as long as broad, and rather broader below the middle, compared to the longitudinal section of an egg; *obovate* is the same form, with the broadest part above the middle.

deltoid, triangular in the form of the Greek letter Δ.

orbicular, *oval*, *oblong*, *elliptical*, *rhomboidal*, etc., when compared to the corresponding mathematical figures.

transversely oblong, or *oblate*, when conspicuously broader than long.

falcate, when curved like the blade of a scythe.

46. Intermediate forms between any two of the above are expressed by combining two terms. Thus a *linear-lanceolate* leaf is long and narrow yet broader below the middle, and tapering to a point; a *linear-oblong* one is scarcely narrow enough to be called linear, yet too narrow to be strictly oblong, and does not conspicuously taper either towards the summit or towards the base.

47. The *apex* or *summit* of a leaf is

acute or *pointed*, when it forms an acute angle or tapers to a point.

obtuse or *blunt*, when it forms a very obtuse angle, or more generally when it is more or less rounded at the top.

acuminate or *cuspidate*, when suddenly narrowed at the top, and then more or less prolonged into an *acumen* or *point*, which may be acute or obtuse, linear or tapering. Some botanists make a slight difference between the *acuminate* and *cuspidate* apex, the acumen being more distinct from the rest of the leaf in the latter case than in the former; but in general the two terms are used in the same sense, some preferring the one and some the other.

truncate, when the end is cut off square.

retuse, when very obtuse or truncate, and slightly indented.

emarginate or *notched*, when more decidedly indented at the end of the midrib; *obcordate*, if at the same time approaching the shape of a heart with its point downwards.

mucronate, when the midribe is produced beyond the apex in the form of a small point.

aristate, when the point is fine like a hair.

48. The base of the leaf is liable to the same variations of form as the apex, but the terms more commonly used are *tapering* or *narrowed* for acute and acuminate, *rounded* for obtuse, and *cordate* for emarginate. In all cases the petiole or point of attachment prevent any such absolute termination at the base as at the apex.

49. A leaf may be *cordate* at the base whatever be its length or breadth, or whatever the shape of the two lateral lobes, called *auricles* (or *little ears*), formed by the indenture or notch, but the term *cordiform* or *heart-shaped* leaf is restricted to an ovate and acute leaf, cordate at the base, with rounded auricles. The word auricles is more particularly used as applied to sessile and stem-clasping leaves.

50. If the auricles are pointed, the leaf is more particularly called *auriculate*; it is moreover said to be *sagittate*, when the points are directed downwards, compared to an arrow-head; *hastate*, when the points diverge horizontally, compared to a halbert.

51. A *reniform* leaf is broader than long, slightly but broadly cordate at the base, with rounded auricles, compared to a kidney.

52. In a *peltate* leaf, the stalk, instead of proceeding from the lower edge of the blade, is attached to the under surface, usually near the lower edge, but sometimes in the very centre of the blade. The peltate leaf has usually several principal nerves radiating from the point of attachment, being, in fact, a cordate leaf, with the auricles united.

53. All these modifications of division and form in the leaf pass so gradually one into the other that it is often difficult to say which term is the most applicable—whether the leaf be toothed or lobed, divided or compound, oblong or lanceolate, obtuse or acute, etc. The choice of the most apt expression will depend on the skill of the describer.

54. **Leaves**, when **solid**, **Stems**, **Fruits**, **Tubers**, and other parts of plants, when not flattened like ordinary leaves, are

setaceous or *capillary*, when very slender like bristles or hairs.

acicular when very slender, but stiff and pointed like needles.

subulate, when rather thicker and firmer like awls.

linear, when at least four times as long as thick; *oblong*, when from about two to about four times as long as thick, the terms having the same sense as when applied to flat surfaces.

ovoid, when egg-shaped, with the broad end downwards, *obovoid* if the broad end is upwards; these terms corresponding to *ovate* and *obovate* shapes in flat surfaces.

globular or *spherical*, when corresponding to *orbicular* in a flat surface. *Round* applies to both.

turbinate, when shaped like a top.

conical, when tapering upwards; *obconical*, when tapering downwards, if in both cases a transverse section shows a circle.

pyramidal, when tapering upwards; *obpyramidal*, when tapering downwards, if in both cases a transverse section shows a triangle or polygon.

fusiform, or spindle-shaped, when tapering at both ends; *cylindrical*, when not tapering at either end, if in both cases the transverse section shows a circle, or sometimes irrespective of the transverse shape.

terete, when the transverse section is not angular; *trigonous*, *triquetrous*, if the transverse section shows a triangle, irrespective in both cases of longitudinal form.

compressed, when more or less flattened laterally; *depressed*, when more or less flattened vertically, or at any rate at the top; *obcompressed*, (in the achenes of *Compositæ*), when flattened from front to back.

articulate or *jointed*, if at any period of their growth (usually when fully formed and approaching their decay, or in the case of fruits when quite ripe) they separate, without tearing into two or more pieces placed end to end. The joints where they separate are called *articulations*, each separate piece an *article*. The name of *joint* is, in common language, given both to the articulation and the article, but more especially to the former. Some modern botanists, however, propose to restrict it to the article, giving the name of *joining* to the articulation.

didymous, when slightly two-lobed, with rounded obtuse lobes.

moniliform, *torulose*, or beaded, when much contracted at regular intervals, but not separating spontaneously into articles.

55. In their consistence **Leaves** or other organs are

fleshy, when thick and soft; *succulent* is generally used in the same sense, but implies the presence of more juice.

coriaceous, when firm and dry, or very tough, of the consistence of leather.

crustaceous, when firm and brittle.

chartaceous, or *papyraceous*, when of the consistence of paper,

membranous, when thin and not stiff.

scarious or *scariose*, when very thin, more or less transparent and not green, yet rather stiff.

56. The terms applied botanically to the consistence of solids are those in general use in common language.

57. The mode in which unexpanded leaves are disposed in the leaf bud is called their *vernation* or *præfoliation*; it varies considerably, and technical terms have been proposed to express some of its varieties, but it has been hitherto rarely noticed in descriptive botany.

§ 6. *Scales, Bracts, and Stipules.*

58. **Scales** (*Squamæ*) are leaves very much reduced in size, usually sessile, seldom green or capable of performing the respiratory functions of leaves. In other words, they are organs resembling leaves in their position on the plant, but differing in size, colour, texture, and functions. They are

most frequent on the stock of perennial plants, or at the base of annual branches, especially on the buds of future shoots, when they serve apparently to protect the dormant living germ from the rigour of winter. In the latter case they are usually short, broad, close together, and more or less *imbricated*, that is, overlapping each other like the tiles of a roof. It is this arrangement as well as their usual shape that has suggested the name of *scales*, borrowed from the scales of a fish. Imbricated scales, bracts, or leaves, are said to be *squarrose*, when their tips are pointed and very spreading or recurved.

59. Sometimes, however, most or all the leaves of the plant are reduced to small scales, in which case they do not appear to perform any particular function. The name of *scales* is also given to any small broad scale-like appendages or reduced organs, whether in the flower or any other part of the plant.

60. **Bracts** *(Bracteæ)* are the upper leaves of a plant in flower (either all those of the flowering branches, or only one or two immediately under the flower), when different from the stem-leaves in size, shape, colour, or arrangement. They are generally much smaller and more sessile. They often partake of the colour of the flower, although they very frequently also retain the green colour of the leaves. When small they are often called *scales*.

61. *Floral leaves* or *leafy bracts* are generally the lower bracts or the upper leaves at the base of the flowering branches, intermediate in size, shape, or arrangement, between the stem-leaves and the upper bracts.

62. *Bracteoles* are the one or two last bracts under each flower, when they differ materially in size, shape, or arrangement from the other bracts.

63. **Stipules** are leaf-like or scale-like appendages at the base of the leaf-stalk, or on the node of the stem. When present they are generally two, one on each side of the leaf, and they sometimes appear to protect the young leaf before it is developed. They are however exceedingly variable in size and appearance, sometimes exactly like the true leaves, except that they have no buds in their axils, or looking like the leaflets of a compound leaf, sometimes apparently the only leaves of the plant, generally small and narrow, sometimes reduced to minute scales, spots, or scars, sometimes united into one opposite the leaf, or more or less united with, or *adnate* to the petiole, or quite detached from the leaf, and forming a ring or sheath round the stem in the axil of the leaf. In a great number of plants they are entirely wanting.

64. *Stipellæ*, or secondary stipules, are similar organs, sometimes found on compound leaves at the points where the leaflets are inserted.

65. When scales, bracts, or stipules, or almost any part of the plant besides leaves and flowers are stalked, they are said to be *stipitate*, from *stipes* a *stalk*.

§ 7. *Inflorescence and its Bracts.*

66. The **Inflorescence** of a plant is the arrangement of the flowering branches, and of the flowers upon them. *An Inflorescence* is a flowering branch, or the flowering summit of a plant above the last stem-leaves, with its branches, bracts, and flowers.

67. A single flower, or an inflorescence, is *terminal* when at the summit of a stem or leafy branch, *axillary* when in the axil of a stem-leaf, *leaf-opposed* when opposite to a stem-leaf. The inflorescence of a plant is said to be *terminal* or *terminate* when the main stem and principal branches end in a flower or inflorescence (not in a leaf-bud), *axillary* or *indeterminate* when all the flowers or inflorescences are axillary, the stem or branches ending in leaf buds.

68. A *Peduncle* is the stalk of a solitary flower, or of inflorescence; that is to say, the portion of the flowering branch from the last stem-leaf to the flower, or to the first ramification of the inflorescence, or even up to its last ramifications: but the portion extending from the first to the last ramifications or the axis of inflorescence is often distinguished under the name of *rhachis*.

69. A *Scape* or *radical Peduncle* is a leafless peduncle proceeding from the stock, or from near the base of the stem, or apparently from the root itself.

70. *Pedicel* is the last branch of an inflorescence, supporting a single flower.

71. The branches of inflorescence may be, like those of stems, opposite, alternate, etc. (32, 33), but very often their arrangement is different from that of the leafy branches of the same plant.

72. **Inflorescence** is
centrifugal, when the terminal flower opens first, and those on the lateral branches are successively developed.
centripetal, when the lowest flowers open first, and the main stem continues to elongate, developing fresh flowers.

73. Determinate inflorescence is usually centrifugal. Indeterminate inflorescence is always centripetal. Both inflorescences may be combined on one plant, for it often happens that the main branches of an inflorescence are centripetal, whilst the flowers on the lateral branches are centrifugal, or *vice versâ*.

74. An **Inflorescence** is
a *Spike*, or *spicate*, when the flowers are sessile along a simple undivided axis or rhachis.
a *Raceme*, or *racemose*, when the flowers are borne on pedicels along a single undivided axis or rhachis.
a *Panicle*, or *paniculate*, when the axis is divided into branches bearing two or more flowers.
a *Head*, or *capitate*, when several sessile or nearly sessile flowers are collected into a compact head-like cluster. The short, flat, convex or conical axis on which the flowers are seated, is called the *receptacle*, a term also used for the torus of a single flower (135). The very compact flower-heads of *Compositæ* are often termed *compound flowers*.
an *Umbel*, or *umbellate*, when several branches or pedicels appear to start from the same point and are nearly of the same length. It differs from the head, like the raceme from the spike, in that the flowers are not sessile. An umbel is said to be *simple*, when each of its branches or *rays* bears a single flower; *compound*, when each ray bears a *partial umbel* or *umbellule*.
a *Corymb*, or *corymbose*, when the branches and pedicels, although starting from different points, all attain the same level, the lower ones being much longer than the upper. It is a flat-topped or *fastigiate* panicle.
a *Cyme*, or *cymose*, when branched and centrifugal. It is a centrifugal panicle, and is often corymbose. The central flower opens first. The lateral branches successively developed are usually forked or opposite (dichotomous or trichotomous), but sometimes after the first forking the branches are no longer divided, but produce a succession of pedicels on their upper side, forming apparently unilateral centripetal racemes; whereas if attentively examined, it will be found that each pedicel is at first terminal, but becomes lateral by the development of one outer branch only immediately under the pedicel. Such branches, when in bud, are generally rolled back at the top, like the tail of a scorpion, and are thence called *scorpioid*.
a *Thyrsus*, or *thyrsoid*, when cymes, usually opposite, are arranged in a narrow pyramidal panicle.

75. There are numerous cases where inflorescences are intermediate between some two of the above, and are called by different botanists by one or the other name, according as they are guided by apparent or by theoretical similarity. A spike-like panicle, where the axis is divided into very short branches forming a cylindrical compact inflorescence, is called sometimes a spike, sometimes a panicle. If the flowers are in distinct clusters along a simple axis, the inflorescence is described as an *interrupted* spike or raceme, according as the flowers are nearly sessile or distinctly pedicellate; although when closely examined the flowers will be found to be inserted not on the main axis, but on a very short branch, thus, strictly speaking, constituting a panicle.

76. The *catkins* (*amenta*) of *Amentaceæ*, the *spadices* of several Monocotyledons, the *ears* and *spikelets* of Grasses are forms of the spike.

77. **Bracts** are generally placed singly under each branch of the inflorescence, and under each pedicel; bracteoles are usually two, one on each side, on the pedicel or close under the flower, or even upon the calyx itself; but bracts are also frequently scattered along the branches without axillary pedicels; and when the differences between the bracts and bracteoles are trifling or immaterial, they are usually all called bracts.

78. When these bracts appear to proceed from the same point, they will, on examination, be found to be really either one bract and two stipules, or one bract with two bracteoles in its axil. When two bracts appear to proceed from the same point, they will usually be found to be the stipules of an undeveloped bract, unless the branches of the inflorescence are opposite, when the bracts will of course be opposite also.

79. When several bracts are collected in a whorl, or are so close together as to appear whorled, or are closely imbricated round the base of a head or unbel, they are collectively called an *Involucre*. The bracts composing an involucre are described under the name of *leaves*, *leaflets*, *bracts*, or *scales*, according to their appearance. *Phylaries* is a useless term, lately introduced for the bracts or scales of the involucre of *Compositæ*. An Involucel is the involucre of a partial umbel.

80. When several very small bracts are placed round the base of a calyx or of an involucre, they have been termed a *calycule*, and the calyx or involucre said to be *calyculate*, but the terms are now falling into disuse, as conveying a false impression. When the bracts are whorled and inserted upon the calyx, they form what is frequently called an *epecalyx*.

81. A *Spatha* is a bract or floral leaf enclosing the inflorescence of some Monocotyledons.

82. *Paleæ*, *pales*, or *Chaff*, are the inner bracts or scales in *Compositæ*, *Gramineæ*, and some other plants, when of a thin yet stiff consistence, usually narrow and of a pale colour.

83. *Glumes* are the bracts enclosing the flowers of *Cyperaceæ* and *Gramineæ*.

§ 8. *The Flower in General.*

84. A *complete* **Flower** (15) is one in which the calyx, corolla, stamens, and pistil are all present; a *perfect* flower, one in which all these organs, or such of them as are present, are capable of performing their several functions. Therefore, properly speaking, an *incomplete* flower is one in which any one or more of these organs is wanting; and an *imperfect* flower one in which any one or more of these organs is so altered as to be incapable of properly performing its functions. These imperfect organs are said to be *abortive* if much reduced in size or efficiency, *rudimentary* if so much so as to be scarcely perceptible. But in many works, the term *incomplete* is specially applied to those flowers in which the perianth is simple or wanting, and *imperfect* to those in which either the stamens or pistil are imperfect or wanting.

85. A **Flower** is

dichlamydeous, when the perianth is double, both calyx and corolla being present and distinct.

monochlamydeous, when the perianth is single, whether by the union of the calyx and corolla, or the deficiency of either.

asepalous, when there is no calyx.

apetalous, when there is no corolla.

naked or *achlamydeous*, when there is no perianth at all.

hermaphrodite or *bisexual*, when both stamens and pistil are present and perfect.

male or *staminate*, when there are one or more stamens, but either no pistil at all or an imperfect one.

female or *pistillate*, when there is a pistil, but either no stamens at all, or only imperfect ones.

neuter, when both stamens and pistil are imperfect or wanting.

barren or *sterile*, when from any cause it produces no seed.

fertile, when it does produce seed. In some works the terms *barren*, *fertile*, and *perfect* are also used respectively as synonyms of *male*, *female*, and *hermaphrodite*.

86. The flowers of a plant or species are said collectively to be *unisexual* or *declinous* when the flowers are all either male or female.

monœcious, when the male and female flowers are distinct, but on the same plant.

dicœcious, when the male and female flowers are on distinct plants.

polygamous, when there are male, female, and hermaphrodite flowers on the same or on distinct plants.

87. A head of flowers is *heterogamous* when male, female, hermaphrodite, and neuter flowers, or any two or three of them, are included in one head; *homogamous*, when all the flowers included in one head are alike in this respect. A spike or head of flowers is *androgynous* when male and female flowers are mixed in it. These terms are only used in the case of very few Natural Orders.

88. As the scales of buds are leaves undeveloped or reduced in size and altered in shape and consistence, and bracts are leaves likewise reduced in size, and occasionally altered in colour; so the parts of the flower are considered as leaves still further altered in shape, colour, and arrangement round the axis, and often more or less combined with each other. The details of this theory constitute the comparatively modern branch of botany called *Vegetable Metamorphosis* or *Homology*, sometimes improperly termed *Morphology* (8.)

89. To understand the arrangement of the floral parts, let us take a *complete* flower, in which moreover all the parts are *free* from each other, *definite* in number, *i. e.*, always the same in the same species, and *symmetrical* or *isomerous*, *i.e.*, when each whorl consists of the same number of parts.

90. Such a complete symmetrical flower consists usually of either four or five whorls of altered leaves (88), placed immediately one within the other.

The **Calyx** forms the outer whorl. Its parts are called *sepals*.

The **Corolla** forms the next whorl. Its parts, called *petals*, usually *alternate* with the sepals; that is to say, the centre of each petal is immediately over or within the interval between two sepals.

The **Stamens** form one or two whorls within the petals. If two, those of the outer whorl (the *outer stamens*) alternate with the petals, and are consequently opposite to, or over the centre of the sepals; those of the inner whorl (the *inner stamens*) alternate with the outer ones, and are therefore opposite to the petal. If there is only one whorl of stamens, they most frequently alternate with the petals; but sometimes they are opposite the petals and alternate with the sepals.

The **Pistil** forms the inner whorl; its carpels usually alternate with the inner row of stamens.

91. In an axillary or lateral flower the *upper* parts of each whorl (sepals, petals, stamens, or carpels) are those which are next to the main axis of the stems or branch, the *lower* parts those which are furthest from it; the intermediate ones are said to be *lateral*. The words *anterior* (front) and *posterior* (back) are often used for lower and upper respectively, but their meaning is sometimes reversed if the writer supposes himself in the centre of the flower instead of outside of it.

92. The number of parts in each whorl of a flower is expressed adjectively by the following numerals derived from the Greek :—

mono-,	di-,	tri-,	tetra-,	penta-,	hexa-,	hepta-,	octo-,	ennea-,	deca-,	etc.,	poly-
1-,	2-,	3-,	4-,	5-,	6-,	7-,	8-,	9-,	10-,		*many-*

prefixed to a termination indicating the whorl referred to.

93. Thus, a **Flower** is

disepalous, trisepalous, tetrasepalous, polysepalous, etc., according as there are 2, 3, 4, or many (or an indefinite number of) sepals.
dipetalous, tripetalous, polypetalous, etc., according as there are 2, 3, or many petals.
diandrous, triandrous, polyandrous, etc., according as there are 2, 3, or many stamens.
digynous, trigynous, polygynous, etc., according as there are 2, 3, or many carpels.
And generally (if symmetrical), *dimerous, trimerous, polymerous*, etc., according as there are 2, 3, or many (or an indefinite number of) parts to each whorl.

94. Flowers are *unsymmetrical* or *anisomerous*, strictly speaking, when any one of the whorls has a different number of parts from any other ; but when the carpels alone are reduced in number the flower is still frequently called symmetrical or isomerous, if the calyx, corolla, and staminal whorl have all the same number of parts.

95. Flowers are *irregular* when the parts of any one of the whorls are unequal in size, dissimilar in shape, or do not spread regularly round the axis at equal distances. It is however more especially irregularity of the corolla that is referred to in descriptions. A slight inequality in size or direction in the other whorls does not prevent the flower being classed as *regular*, if the corolla or perianth is conspicuous and regular.

§ 9. *The Calyx and Corolla, or Perianth.*

96. The **Calyx** (90) is usually green, and smaller than the corolla ; sometimes very minute, rudimentary, or wanting, sometimes very indistinctly wholed, or not whorled at all, or in two whorls, or composed of a large number of sepals of which the outer ones pass gradually into bracts, and the inner ones into petals.

97. The **Corolla** (90) is usually coloured, and of a more delicate texture than the calyx, and, in popular language, is often more specially meant by the *flower*. Its petals are more rarely in two whorls, or indefinite in number, and the whorl more rarely broken than in the case of the calyx, at least when the plant is in a natural state. *Double flowers* are in most cases an accidental deformity or monster in which the ordinary number of petals is multiplied by the conversion of stamens, sepals, or even carpels into petals, by the division of ordinary petals or simply by the addition of supernumerary ones. Petals are also sometimes very small, rudimentary, or entirely deficient.

98. In very many cases, a so-called *simple perianth* (15) (of which the parts are usually called *leaves or segments*) is one in which the sepals and petals are similar in form and texture, and present apparently a single whorl. But if examined in the young bud, one half of the parts will generally be found to be placed outside the other half, and there will frequently be some slight difference in texture, size, and colour, indicating to the close observer the presence of both calyx and corolla. Hence much discrepancy in descriptive works. Where one botanist describes a simple perianth of six segments, another will speak of a double perianth of three sepals and three petals.

99. The following terms and prefixes, expressive of the modifications of form and arrangement of the corolla and its petals, are equally applicable to the calyx and its sepals, and to the simple perianth and its segments.

100. The Corolla is said to be *monopetalous* when the petals are united, either entirely or at the base only, into a cup, cube, or ring ; *polypetalous* when they are all free from the base. These expressions, established by a long usage, are not strictly correct, for *monopetalous* (consisting of a single petal) should apply rather to a corolla really reduced to a single petal, which would then be on one side of the axis ; and *polypetalous* is sometimes used more appropriately for a corolla with an indefinite number of petals. Some modern botanists have therefore proposed the term *gamopetalous* for the corolla with united petals, and *dialypetalous* for that with free petals ; but the old established expressions are still the most generally used.

101. When the petals are partially united, the lower entire portion of the corolla is called the *tube* whatever be its shape, and the free portions of the petals are called the *teeth, lobes*, or *segments* (39), according as they are short or long in proportion to the whole length of the corolla. When the tube is excessively short, the petals appear at first sight free, but their slight union at the base must be carefully attended to, being of importance in classification.

102. The **Æstivation** of a corolla is the arrangement of the petals or of such portion of them as is free, in the unexpanded bud. It is

valvate, when they are strictly whorled in their whole length, their edges being placed against each other without overlapping. If the edges are much inflexed, the æstivation is at the same time *induplicate ; involute*, if the margins are rolled inward ; *reduplicate*, if the margins project outwards into salient angles ; *revolute*, if the margins are rolled outwards ; *plicate* if the petals are folded in longitudinal plaits.

imbricate, when the whorl is more or less broken by some of the petals being outside the others, or by their overlapping each other at least a the top. Five-petaled imbricate corollas are quincuncially imbricate when one petal is outside, and an adjoining one wholly inside, the three others intermediate and overlapping on one side ; bilabiate, when two adjoining ones are inside or outside the three others. Imbricate petals are described as *crumpled (corrugate)* when puckered irregularly in the bud.

twisted, contorted, or *convolute*, when each petal overlaps an adjoining one on one side, and is overlapped by the other adjoining one on the other side. Some botanists include the twisted æstivation in the general term *imbricate ;* others carefully distinguish the one from the other.

103. In a few cases the overlapping is so slight that the three æstivations cannot easily be distinguished one from the other ; in a few others the æstivation is variable, even in the same species, but, in general, it supplies a constant character in species, in genera, or even in Natural Orders.

104. In general shape of the **Corolla** is

tubular, when the whole or the greater part of it is in the form of a tube or cylinder.
campanulate, when approaching in some measure the shape of a cup or bell.
ucreolate, when the tube is swollen or nearly globular, contracted at the top, and slightly expanded again in a narrow rim.
rotate or *stellate*, when the petals or lobes are spread out horizontally from the base, or nearly so, like a wheel or star.
hypocrateriform or *salver-shaped*, when the lower part is cylindrical and the upper portion expanded horizontally. In this case the name of *tube* is restricted to the cylindrical part, and the horizontal portion is called the *limb*, whether it be divided to the base or not. The orifice of the tube is called its *mouth* or *throat*.

Infundibuliform or *funnel shaped*, when the tube is cylindrical at the base, but enlarged at the top into a more or less campanulate limb, of which the lobes often spread horizontally. In this case the campanulate part, up to the commencement of the lobes, is sometimes considered as a portion of the tube, sometimes as a portion of the limb, and by some botanists again described as independent of either, under the name of *throat* (*fauces*). Generally speaking, however, in campanulate, infundibuliform, or other corollas, where the lower entire part passes gradually into the upper divided and more

spreading part, the distinction between the *tube* and the *limb* is drawn either at the point where the lobes separate, or at the part where the corolla first expands, according to which is the most marked.

105. Irregular corollas have received various names according to the more familiar forms they have been compared to. Some of the most important are the

bilabiate, or *two-lipped* corolla, when, in a four or five-lobed corolla, the two or three upper lobes stand obviously apart, like an *upper lip*, from the two or three lower ones or *under lip*. In *Orchideæ* and some other families the name of lip, or *labellum*, is given to one of the divisions or lobes of the perianth.

personate, when two-lipped, and the orifice of the tube closed by a projection from the base of the upper or lower lip, called a *palate*.

ringent, when very widely two-lipped, and the orifice of the tube very open.

spurred, when the tube or the lower part of a petal has a conical hollow projection, compared to the spur of a cock; *saccate*, when the spur is short and round like a little bag; *gibbous*, when projecting at any part into a slight swelling; *foveolate*, when marked in any part with a slight glandular or thickened cavity.

resupinate or *reversed*, when a lip, spur, etc., which in allied species is usually lowest, lies uppermost, and *vice versâ*.

106. The above terms are mostly applied to the forms of monopetalous corollas, but several are also applicable to those of polypetalous ones. Terms descriptive of the special forms of corolla in certain Natural Orders, will be explained under those Orders respectively.

107. Most of the terms used for describing the forms of leaves (39, 45) are also applicable to those of individual petals, but the flat expanded portion of a petal, corresponding to the blade of the leaf, is called its *lamina*, and the stalk, corresponding to the petiole, its *claw (unguis)*. The stalked petal is said to be *unguiculate*.

§ 10. *The Stamens.*

108. Although in a few cases the outer stamens may gradually pass into petals, yet, in general, **Stamens** are very different in shape and aspect from leaves, sepals or petals. It is only in a theoretical point of view (not less important in the study of the physiological economy of the plant) that they can be called altered leaves.

109. This usual form is a stalk, called the *filament*, bearing at the top an *anther* divided into two pouches or *cells*. These anther-cells are filled with *pollen*, consisting of minute grains, usually forming a yellow dust, which, when the flower expands, is scattered from an opening in each cell. When the two cells are not closely contiguous, the portion of the anther that unites them is called the *connectivum*.

110. The filament is often wanting, and the anther sessile, yet still the stamen is perfect; but if the anther, which is the essential part of the stamens, is wanting, or does not contain pollen, the stamen is imperfect, and is then said to be *barren* or *sterile* (without pollen), *abortive*, or *rudimentary* (84), according to the degree to which the imperfection is carried. Imperfect stamens are often called *staminodia*.

111. In unsymmetrical flowers, the stamens of each whorl are someti mes reduced in number below that of the petals, even to a single one, and in several Natural Orders they are multiplied indefinitely.

112. The terms *monandrous* and *polyandrous* are restricted to flowers which have really but one stamen, or an indefinite number respectively. Where several stamens are united into one, the flower is said to be *synandrous*.

113. **Stamens** are

monadelphous, when united by their filaments into one cluster. This cluster either forms a tube round the pistil, or, if the pistil is wanting, occupies the centre of the flowers.

diadelphous, when so united into two clusters or *phalanges*. The term is more especially applied to certain *Leguminosæ*, in which nine stamens are united in a tube slit open on the upper side, and a tenth, placed in a slit, is free. In some other plants the stamens are equally distributed in the two clusters.

triadelphous, *pentadelphous*, *polyadelphous*, when so united into three, five, or many clusters or *phalanges*.

syngenesious, when united by their anthers in a ring round the pistil, the filaments usually remaining free.

didynamous, when (usually in a bilabiate flower) there are four stamens in two pairs, those of one pair longer than those of the other.

tetradynamous, when (in Cruciferæ) there are six, four of them longer than the two others.

exserted, when longer than the corolla, or even when longer than its tube, if the limb be very spreading.

114. An **Anther** (109) is

adnate, when continuous with the filament, the anther-cells appearing to lie their whole length along the upper part of the filament.

innate, when firmly attached by their base to the filament. This is an adnate anther when rather more distinct from the filament.

versatile, when attached by their back to the very point of the filament, so as to swing loosely.

115. Anther cells may be *parallel* or *diverging* at a less or greater angle; or *divaricate*, when placed end to end so as to form one straight line. The end of each anther-cell placed nearest to the other cell is generally called its *apex* or *summit*, and the other end its *base* (36); but some botanists reverse the sense of these terms.

116. Anthers have often, on their connectivum or cells, appendages termed *bristles* (setæ), *spurs*, *crests*, *points*, *glands*, etc., according to their appearance.

117. Anthers have occasionally only one cell: this may take place either by the disappearance of the partition between two closely contiguous cells, when these cells are said to be *confluent*; or by the abortion or total deficiency of one of the cells, when the anther is said to be *dimidiate*.

118. Anthers will open or *dehisce* to let out the pollen, like capsules, in *valves*, *pores*, or *slits*. Their dehiscence is *introrse*, when the opening faces the pistil; *extrorse*, when towards the circumference of the flower.

119. Pollen (109) is not always in the form of dust. It is sometimes collected in each cell into one or two little wax-like masses. Special terms used in describing these masses or other modifications of the pollen will be explained under the Orders where they occur.

§ 11. *The Pistil.*

120. The carpels (91) of the **Pistil**, although they may occasionally assume, rather more than stamens, the appearance and colour of leaves, are still more different in shape and structure. They are usually sessile; if stalked, their stalk is called a *podocarp*. This stalk, upon which each separate carpel is supported above the receptacle, must not be confounded with the *gynobasis* (143), upon which the whole pistil is sometimes raised.

121. Each carpel consists of three parts:

1 the **Ovary**, or enlarged base, which includes one or more cavities or *cells*, containing one or more small bodies called *ovules*. These are the earliest condition of the future seeds.

2 the **Style**, proceeding from the summit of the ovary, and supporting—

3 the **Stigma**, which is sometimes a point (or *punctiform* stigma) or small head (a *capitate* stigma) at the top of the style or ovary, sometimes a portion of its surface more or less lateral and variously shaped, distinguished by a looser texture, and covered with minute protuberances called *papillæ*.

122. The style is often wanting, and the stigma is then sessile on the ovary, but in the perfect pistil there is always at least one ovule in the ovary, and some portion of stigmatic surface. Without these the pistil is imperfect, and said to be *barren* (not setting seed), *abortive*, or *rudimentary* (84) according to the degree of imperfection.

123. The ovary being the essential part of the pistil, most of the terms relating to the number, arrangement, etc. of the carpels, apply specially to their ovaries. In some works each separate carpel is called a pistil, all those of a flower constituting together the *gynœcium ;* but this term is in little use, and the word *pistil* is more generally applied in a collective sense. When the ovaries are at all united, they are commonly termed collectively a compound ovary.

124. The number of carpels or ovaries in a flower is frequently reduced below that of the parts of the other floral whorls, even in flowers otherwise symmetrical. In a very few genera, however, the ovaries are more numerous than the petals, or indefinite. They are in that case either arranged in a single whorl, or form a head or spike in the centre of the flower.

125. The terms *monogynous, digynous, polygynous,* etc. (with a pistil of one, two, or more parts), are vaguely used, applying sometimes to the whole pistil, sometimes to the ovaries alone, or to the styles or stigmas only. Where a more precise nomenclature is adopted, the flower is

monocarpellary, when the pistil consists of a single simple carpel.

bi-, tri, etc., to *poly-carpellary,* when the pistil consists of two, three, or an indefinite number of carpels, whether separate or united,

syncarpous, when the carpels or their ovaries are more or less united into one compound ovary.

apocarpous, when the carpels or ovaries are all free and distinct.

126. A *compound* ovary is

unilocular or *one-celled,* when there are no partitions between the ovules, or when these partitions do not meet in the centre so as to divide the cavity into several cells.

plurilocular or *several-celled,* when completely divided into two or more cells by partitions called *dissepiments (septa),* usually vertical and radiating from the centre or axis of the ovary to its circumference.

by-, tri, etc., to *multi-locular,* according to the number of these cells, two, three, etc., or many.

127. In general the number of cells or of dissepiments, complete or partial, or of rows of ovules, corresponds with that of the carpels, of which the pistil is composed. But sometimes each carpel is divided completely or partially into two cells, or has two rows of ovules, so that the number of carpels appears double what it really is. Sometimes again the carpels are so completely combined and reduced as to form a single cell, with a single ovule, although it really consists of several carpels. But in these cases the ovary is usually described as it appears, as well as such as it is theoretically supposed to be.

128. In apocarpous pistils the styles are usually free, each bearing its own stigma. Very rarely the greater part of the styles, or the stigmas alone, are united, whilst the ovaries remain distinct.

129. Syncarpous pistils are said to have

several styles, when the styles are free from the base.

one style, with several branches, when the styles are connected at the base, but separate below the point where the stigmas or stigmatic surface commence.

one simple style, with several stigmas, when united up to the point where the stigmas or stigmatic surfaces commence, and then separating.

one simple style, with a branched, lobed, toothed, notched, or *entire stigma* (as the case may be), when the stigmas also are more or less united. In many works, however, this precise nomenclature is not strictly adhered to, and considerable confusion is often the result.

130. In general the number of styles, or branches of the style or stigma, is the same as that of the carpels, but sometimes that number is doubled, especially in the stigmas, and sometimes the stigmas are dichotomously or pinnately branched, or *penicillate,* that is, divided into a tuft of hair-like branches. All these variations sometimes make it a difficult task to determine the number of carpels forming a compound ovary, but the point is of considerable importance in fixing the affinities of plants, and, by careful consideration, the real as well as the apparent number has now in most cases been agreed upon.

131. The *placenta* is the part of the inside of the ovary to which the ovules are attached, sometimes a mere point or line on the inner surface, often more or less thickened or raised. Placentation is therefore the indication of the part of the ovary to which the ovules are attached.

132. Placentas are

axile, when the ovules are attached to the axis or centre, that is in plurilocular ovaries when they are attached to the inner angle of each cell ; in unilocular simple ovaries, which have almost always an excentrical style or stigma, when the ovules are attached to the side of the ovary nearest to the style ; in unilocular compound ovaries, when the ovules are attached to a central protuberance, column, or axis rising up from the base of the cavity. If this column does not reach the top of the cavity, the placenta is said to be *free* and *central.*

parietal, when the ovules are attached to the inner surface of the cavity of a one-celled compound ovary. Parietal placentas are usually slightly thickened or raised lines, sometimes broad surfaces nearly covering the inner surface of the cavity, sometimes projecting far into the cavity, and constituting partial dissepiments, or even meeting in the centre, but without cohering there. In the latter case the distinction between the one-celled and the several-celled ovary sometimes almost disappears.

133. Each **Ovule** (121), when fully formed, usually consists of a central mass or *nucleus* enclosed in two bag like *coats,* the outer one called *primine,* the inner one *secundine.* The *chalaza* is the point of the ovule at which the base of the nucleus is confluent with the coats. The *foramen* is a minute aperture in the coats over the *apex* of the nucleus.

134. **Ovules** are

orthotropous or *straight,* when the chalaza coincides with the base (36) of the ovule, and the foramen is at the opposite extremity, the axis of the ovule being straight.

campylotropous or *incurved,* when the chalara still coinciding with the base of the ovule, the axis of the ovule is curved, bringing the foramen down more or less towards that base.

anatropous or *inverted,* when the chalaza is at the apex of the ovule, and the foramen next to its base, the axis remaining straight. In this, one of the most frequent forms of the ovule, the chalaza is connected with the base by a cord, called the *rhaphe,* adhering to one side of the ovule, and becoming more or less incorporated with its coats, as the ovule enlarges into a seed.

amphitropous or *half-inverted,* when the ovule being as it were attached laterally, the chalaza and foramen at opposite ends of its straight or curved axis are about equally distant from the base or point of attachment.

§ 12. *The Receptacle and Relative Attachment of the Floral Whorls.*

135. The **Receptacle** or *torus* is the extremity of the peduncle (above the calyx), upon which the corolla, stamens, and ovary are inserted. It is sometimes little more than a mere point or minute hemisphere, but it is often also more or less elongated, thickened, or otherwise enlarged. It must not be confounded with the receptacle of inflorescence (74).

136. A *Disk* or *disc*, is a circular enlargement of the receptacle, usually in the form of a cup *(cupular)* of a flat disk or quoit, or of a cushion *(pulvinate)*. It is either immediately at the base of the ovary within the stamens, or between the petals and stamens, or bears the petals or stamens or both on its margin, or is quite at the extremity of the receptacle, with the ovaries arranged in a ring round it or under it.

137. The disk may be *entire*, or *toothed* or *lobed*, or *divided* into a number of parts usually equal to or twice that of the stamens or carpels. When the parts of the disk are quite separate and short, they are often called *glands*.

138. *Nectaries* are either the disk, or small deformed petals, or abortive stamens, or appendages at the base of petals, or stamens, or any small bodies within the flower which do not look like petals, stamens, or ovaries. They were formerly supposed to supply bees with their honey, and the term is frequently to be met with in the older Floras, but is now deservedly going out of use.

139. When the disk bears the petals and stamens, it is frequently adherent to, and apparently forms part of, the tube of the calyx, or it is adherent to, and apparently forms part of, the ovary, or of both calyx-tube and ovary. Hence the three following important distinctions in the relative insertion of the floral whorls.

140. *Petals*, or as it is frequently expressed, flowers, are

hypogynous (*i. e.* under the ovary), when they or the disk that bears them are entirely free both from the calyx and ovary. The ovary is then described as *free* or *superior*, the calyx as *free* or *inferior*, the petals as being *inserted on the receptacle.*

perigynous (*i. e.* round the ovary), when the disk bearing the petals is quite free from the ovary, but is more or less combined with the base of the calyx tube. The ovary is then still described as *free* or *superior*, even though the combined disk and calyx-tube may form a deep cup with the ovary lying in the bottom; the calyx is said to be *free* or *inferior*, and the petals are described as *inserted on the calyx.*

epigynous (*i. e.* upon the ovary), when the disk bearing the petals is combined both with the base of the calyx-tube and the base outside of the ovary; either closing over the ovary so as only to leave a passage for the style, or leaving more or less of the top of the ovary free, but always adhering to it above the level of the insertion of the lowest ovule (except in a very few cases where the ovules are absolutely suspended from the top of the cell). In epigynous flowers the ovary is described as *adherent* or *inferior*, the calyx as *adherent* or *superior*, the petals as *inserted on* or *above the ovary*. In some works, however, most epigynous flowers are included in the perigynous ones, and a very different meaning is given to the term *epigynous* (144), and there are a few cases where no positive distinction can be drawn between the epigynous and perigynous flowers, or gain between the perigynous and hypogynous flowers.

141. When there are no petals, it is the insertion of the stamens that determines the difference between the hypogynous, perigynous, and epigynous flowers.

142. When there are both petals and stamens

in hypogynous flowers, the petals and stamens are usually free from each other, but sometimes they are combined at the base. In that case if the petals are distinct from each other, and the stamens are monadelphous, the petals are often said to be *inserted on* or *combined with the staminal tube;* if the coralla is gamopetalous and the stamens distinct from each other, the latter are said to be *inserted in the tube of the corolla.*

in perigynous flowers, the stamens are usually inserted immediately within the petals, or alternating with them on the edge of the disk, but occasionally much lower down within the disk, or even on the unenlarged part of the receptacle.

in epigynous flowers, when the petals are distinct, the stamens are usaully inserted as in perigynous flowers; when the corolla is gamopetalous, the stamens are either free and epigynous, or combined at the base with (inserted in) the tube of the corolla.

143. When the receptacle is distinctly elongated below the ovary, it is often called a *gynobasis*, *gynophore*, or *stalk of the ovary*. If the elongation takes place before the stamens or below the petals, these stamens or petals are then said to be *inserted on the stalk of the ovary*, and are occasionally, but falsely, described as *epigynous*. Really epigynous stamens (*i. e.* when the filaments are combined with the ovary) are very rare, unless the rest of the flower is epigynous.

144. An *epigynous disk* is a name given either to the thickened summit of the ovary in epigynous flowers, or very rarely to a real disk or enlargement of the receptacle closing over the ovary.

145. In the relative position of any two or more parts of the flower, whether in the same or in different whorls, they are

connivent, when nearer together at the summit than at the base.

divergent, when further apart at the summit than at the base.

coherent, when united together, but so slightly that they can be separated with little or no laceration; and one of the two coherent parts, (usually the smallest or least important) is said to be *adherent* to the other. Grammatically speaking, these two terms convey nearly the same meaning but require a different form of phrase; practically however it has been found more convenient to restrict *cohesion* to the union of parts of the same whorl, and *adhesion* to the union of parts of different whorls.

connate, when so closely united that they cannot be separated without laceration. Each of the two connate parts, and especially that one which is considered the smaller or of the least importance, is said to be *adnate* to the other.

free, when neither coherent nor connate.

distinct is also used in the same sense, but is also applied to parts distinctly visible or distinctly limited.

§ 13. *The Fruit.*

146. The **Fruit** (15) consists of the ovary and whatever other parts of the flower are *persistent* (*i. e.* persist at the time the seed is ripe), usually enlarged, and more or less altered in shape and consistence. It encloses or covers the seed or seeds till the period of maturity, when it either opens for the seed to escape, or falls to the ground with the seed. When stalked, its stalk has been termed a *carpophore.*

147. Fruits are, in elementary works, said to be *simple* when the result of a single flower, *compound* when they proceed from several flowers closely packed or combined in a head. But as a fruit resulting from a single flower, with several distinct carpels, is compound in the sense in which that term is a applied to the ovary, the terms *single* and *aggregate*, proposed for the fruit resulting from one or several flowers, may be more appropriately adopted. In descriptive botany a fruit is always supposed to result from a single flower unless the contrary be stated. It may, likely the pistil, be syncarpous or apocarpous (125), and as in many cases carpels united in the flower may become separate as they ripen, an apocarpous fruit may result from a syncarpous pistil.

148. The involucre or bracts often persist and form part of aggregate fruits, but very seldom so in single ones.

149. The receptacle becomes occasionally enlarged and succulent; if when ripe it falls off with the fruit, it is considered as forming part of it.

150. The adherent part of the calyx of epigynous flowers always persists and forms part of the fruit; the free part of the calyx of epigynous flowers or the calyx of perigynous flowers, either persists entirely at the top of or round the fruit, or the lobes alone fall off, or the lobes fall off with whatever part of the calyx is above the insertion of the petals, or the whole of what is free from the ovary falls off, including the disk bearing the petals. The calyx of hypogynous flowers usually falls off entirely or persists entirely. In general a calyx is called deciduous if any part falls off. When it persists it is either enlarged round or under the fruit, or it withers and dries up.

151. The corolla usually falls off entirely; when it persists it is usually withered and dry *(marcescent)*, or very seldom enlarges round the fruit.

152. The stamens either fall off, or more or less of their filaments persist, usually withered and dry.

153. The style sometimes falls off or dries up and disappears; sometimes persists, forming a point to the fruit, or becomes enlarged into a wing or other appendage to the fruit.

154. The *Pericarp* is the portion of the fruit formed of the ovary and whatever adheres to it exclusive of and outside of the seed or seeds, exclusive also of the persistent receptacle, or of whatever portion of the calyx persists round the ovary without adhering to it.

155. Fruits have often external appendages called *wings* (alæ), *beaks, crests, awns*, etc., according to their appearance. They are either formed by persistent parts of the flower more or less altered, or grow out of the ovary or the persistent part of the calyx. If the appendage be a ring of hairs or scales round the top of the fruit, is is called a *pappus*.

156. Fruits are generally divided into *succulent*, (including *fleshy, pulpy* and *juicy* fruits) and *dry*. They are *dehiscent* when they open at maturity to let out the seeds, *indehiscent* when they do not open spontaneously but fall off with the seeds. Succulent fruits are usually indehiscent.

157. The principal kinds of succulent fruits are

the *Berry*, in which the whole substance of the pericarp is fleshy or pulpy, with the exception of the outer skin or rind, called the *Epicarp*. The seeds themselves are usually immersed in the pulp; but in some berries, the seeds are separated from the pulp by the walls of the cavity or cells of the ovary, which form as it were a thin inner skin or rind, called the *Endocarp*.

the *Drupe*, in which the pericarp, when ripe, consists of two distinct portions, an outer succulent one called the *Sarcocarp, Mesocarp* (covered like the berry by a skin or epicarp), and an inner dry endocarp called the *Putamen*, which is either *cartilaginous* (of the consistence of parchment), or hard and woody. In the latter case it is commonly a *stone*, and the drupe a *stone-fruit*. When the putamen consists of several distinct stones or nuts each enclosing a seed, they are called *pyrenes*, or sometimes *kernels*.

158. The principal kinds of dry fruits are

the *Capsule* or *Pod*,* which is dehiscent. When ripe the pericarp usually splits longitudinally into as many or twice as many pieces, called valves, as it contains cells or placentas. If these valves separate at the line of junction of the carpels, that is, along the line of the placentas or dissepiments, either splitting them or leaving them attached to the axis, the dehiscence is termed *septicidal*; if the valves separate between the placentas or dissepiments, the dehiscence is *loculicidal*, and the valves either bear the placentas or dissepiments along their middle line, or leave them attached to the axis. Sometimes also the capsule discharges its seeds by *slits, chinks*, or *pores*, more or less regularly arranged, or bursts irregularly, or separates into two parts by a horizontal line; in the latter case it is said to be *circumsciss*.

the *Nut* or *Achene*, which is indehiscent and contains but a single seed. When the pericarp is thin in proportion to the seed it encloses, the whole fruit (or each of its lobes) has the appearance of a single seed, and is so called in popular language. If the pericarp is thin and rather loose, it is often called a *Utricle*. A *Samara* is a nut with a wing at its upper end.

159. Where the carpels of the ovary are distinct (125) they may severally become as many distinct berries, drupes, capsules, or achenes. Separate carpels are usually more or less compressed laterally, with more or less prominent inner and outer edges, called *sutures*, and, if dehiscent, the carpel usually opens at these sutures. A *Follicle* is a carpel opening at the inner suture only. In some cases where the carpels are united in the ovary they will separate when ripe; they are then called *Cocci* if one-seeded.

160. The peculiar fruits of some of the large Orders have received special names, which will be explained under each Order. Such are the *siliqua* and *silicule* of Cruciferæ, the *legume* of Leguminosæ, the *pome* of Pyrus and its allies, the *pepo* of Cucurbitaceæ, the *cone* of Coniferæ, the *grain* or *caryopsis* of Gramineæ, etc.

§ 14. *The Seed.*

161. The **Seed** is enclosed in the pericarp in the great majority of flowering plants, called therefore *Angiosperms*, or *angiospermous plants*. In *Coniferæ* and a very few allied genera, called *Gymnosperms*, or *gymnospermous plants*, the seed is naked, without any real pericarp. These truly gymnospermous plants must not be confounded with *Labiatæ, Borragineæ*, etc., which have also been falsely called gymnospermous, their small nuts having the appearance of seeds (158).

162. The seed when ripe contains an *embryo* or young plant, either filling or nearly filling the cavity, but not attached to the outer skin or the seed, or more or less immersed in a mealy, oily, fleshy, or horn-like substance, called the *albumen*, or *perisperm*. The presence or absence of this albumen, that is, the distinction between *albuminous* and *exalbuminous* seeds, is one of great importance. The embryo or albumen can often only be found or distinguished when the seed is quite ripe, or sometimes only when it begins to germinate.

163. The shell of the seed consists usually of two separable *coats*. The outer coat, called the *testa*, is usually the principal one, and in most cases the only one attended to in descriptions. It may be hard and *crustaceous*, woody or bony, or thin and *membranous* (skin-like), dry, or rarely succulent. It is sometimes expanded into *wings*, or bears a tuft of hair, cotton, or wool, called a *coma*. The inner coat is called the *tegmen*.

164. The *funicle* is the stalk by which the seed is attached to the placenta. It is occasionally enlarged into a membranous, pulpy, or fleshy appendage, sometimes spreading over a considerable part of the seed, or nearly enclosing it, called an *aril*. A *strophiole* or *caruncle* is a similar appendage proceeding from the testa by the side of or near the funicle.

165. The *hilum* is the scar left on the seed where it separates from the funicle. The *micropyle* is a mark indicating the position of the foramen of the ovule (133).

166. The **Embryo** (162) consists of the *Radicle* or base of the future root, one or two *Cotyledons* or future seed leaves, and the *Plumule* or future bud within the base of the cotyledons. In some seeds, especially where there is no albumen, these several parts are very conspicuous, in others they are very difficult to distinguish until the seed begins to germinate. Their observation, however, is of the greatest importance, for it is chiefly upon the distinction between the embryo with one or with two cotyledons that are founded the two great classes of phænogamous plants, *Monocotyledons* and *Dicotyledons*. Cotyledons are said to be *conduplicate* when folded once length-wise; *contortuplicate* when variously folded or twisted; *conferruminate* when so united that no line of separation can be traced.

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* In English descriptions, *pod* is more frequently used when it is long and narrow; *capsule*, or sometimes *pouch*, when it is short and thick or broad.

167. Although the embryo lies loose (unattached) within the seed, it is generally in some determinate position with respect to the seed or to the whole fruit. This position is described by stating the direction of the radicle next to or more or less remote from the *hilum*, or it is said to be *superior* if pointing towards the summit of the *fruit*, *inferior* if pointing towards the base of the *fruit*.

§ 15. *Accessory Organs.*

168. Under this name are included, in many elementary works, various external parts of plants which do not appear to act any essential part either in the vegetation or reproduction of the plant. They may be classed under four heads: *Tendrils* and *Hooks*, *Thorns* and *Prickles*, *Hairs* and *Glands*.

169. **Tendrils** (*cirrhi*) are usually abortive petioles, or abortive peduncles, or sometimes abortive ends of branches. They are simple or more or less branched, flexible, and coil more or less firmly round any objects within their reach, in order to support the plant to which they belong. *Hooks* are similar holdfasts, but of a firmer consistence, not branched, and less coiled.

170. **Thorns** and **Prickles** have been fancifully called the weapons of plants. A *Thorn* or *Spine* is the strongly pointed extremity of a branch, or abortive petiole, or abortive peduncle. A *Prickle* is a sharply pointed excrescence from the epidermis, and is usually produced on a branch on the petiole or veins of a leaf, or on a peduncle, or even on the calyx or corolla. When the teeth of a leaf or the stipules are pungent, they are also called *prickles*, not *thorns*. A plant is *spinous* if it has thorns, *aculeate* if it has prickles.

171. **Hairs**, in the general sense, or the *indumentum* (or clothing) of a plant, include all those productions of the epidermis which have, by a more or less appropriate comparison, been termed *bristles*, *hairs*, *down*, *cotton*, or *wool*.

172. Hairs are often branched. They are said to be *attached by the centre*, if parted from the base, and the forks spread along the surface in opposite directions; *plumose*, if the branches are arranged along a common axis, as in a feather; *stellate*, if several branches radiate horizontally. These stellate hairs have sometimes their rays connected together at the base, forming little flat circular disks attached by the centre, and are then called *scales* and the surface is said to be *scaly* or *lepidote*.

173. The *Epidermis*, or outer skin, of an organ, as to its surface and indumentum, is

smooth, when without any protuberance whatever.
glabrous, when without hairs of any kind.
glabrescent glabrœte, becoming glabrous.
striate, when marked with parallel longitudinal lines, either slightly raised or merely discoloured.
furrowed (*sulcate*) or *ribbed* (*costate*) when the parallel lines are more distinctly raised.
rugose, when wrinkled or marked with irregular raised or depressed lines.
umbilicate, when marked with a small round depression.
umbonate, when bearing a small boss like that of a shield.
viscous, *viscid*, or *glutinous*, when covered with a sticky or clammy exudation.
scabrous, when rough to the touch.
tuberculate or *warted*, when covered with small, obtuse, wart-like protuberances.
muricate, when the protuberances are more raised and pointed but yet short and hard.
echinate, when the protuberances are longer and sharper, almost prickly.
setose or *bristly*, when bearing very stiff erect straight hairs.
glandular-setose, when the setæ or bristles terminate in a minute resinous head or drop. In some works, especially in the case of Roses and *Rubes*, the meaning of *setæ* has been restricted to such as are glandular.
glochidiate, when the setæ are hooked at the top.
pilose, when the surface is thinly sprinkled with rather long simple hairs.
hispid, when more thickly covered with rather stiff hairs.
hirsute, when the hairs are dense and not so stiff.
downy or *pubescent*, when the hairs are short and soft; *puberulent*, when slightly pubescent.
strigose, when the hairs are rather short and stiff, and lie close along the surface all in the same direction; *strigillose*, when slightly strigose.
tomentose or *cottony*, when the hairs are very short and soft, rather dense and more or less intricate, and usually white or whitish.
woolly (*lanate*), when the hairs are long and loosely intricate, like wool. The wool or tomentum is said to be *floccose* when closely intricate and readily detached, like fleece.
mealy (*farinose*), when the hairs are excessively short, intricate and white, and come off readily, having the appearance of meal or dust.
canescent or *hoary*, when the hairs are so short as not readily to be distinguished by the naked eye, and yet give a general whitish hue to the epidermis.
glaucous, when of a pale bluish-green, often covered with a fine bloom.
glaucescent, *subglaucous* or becoming glaucous.

174. The meanings here attached to the above terms are such as appear to have been most generally adopted, but there is much vagueness in the use practically made of many of them by different botanists. This is especially the case with the terms *pilose*, *hispid*, *hirsute*, *pubescent*, and *tomentose*.

175. The name of **Glands** is given to several different productions, and principally to the four following:—

1—Small wart-like or shield-like bodies, either sessile or sometimes stalked, of a fungous or somewhat fleshy consistence, occasionally secreting a small quantity of oily or resinous matter, but more frequently dry. They are generally few in number, often definite in their position and form, and occur chiefly on the petiole or principal veins of leaves, on the branches of inflorescences, or on the stalks or principal veins of bracts, sepals or petals.

2—Minute raised dots, usually black, red, or dark-coloured, of a resinous or oily nature, always superficial, and apparently exudations from the epidermis. They are often numerous on leaves, bracts, sepals, and green branches, and occur even on petals and stamens, more rarely on pistils. When raised upon slender stalks they are called *pedicellate* (or *stipitate*) *glands*, or *glandular hairs*, according to the thickness of the stalk.

3—Small, globular, oblong or even linear vesicles, filled with oil, imbedded in the substance itself of leaves, bracts, floral organs, or fruits. They are often very numerous, like transparent dots, sometimes few and determinate in form and position. In the pericarp of *Umbelliferæ* they are remarkably regular and conspicuous, and take the name of *vittæ*.

4—*Lobes* of the disk (137), or other small fleshy excrescences within the flower, whether from the receptacle, calyx, corolla, stamens, or pistil.

Chap. II. Classification, or Systematic Botany.

176. It has already been observed (3) that descriptions of plants should, as nearly as possible, be arranged under natural divisions, so as to facilitate the comparison of each plant with those most nearly allied to it. The descriptions of plants here alluded to are descriptions of *species;* the natural divisions of the Flora refer to natural *groups of species.*

177. A **Species** comprises all the individual plants which resemble each other sufficiently to make us conclude that they are all, or *may have been* all, descended from a common parent. These individuals may often differ from each other in many striking particulars, such as the colour of the flower, size of the leaf, etc., but these particulars are such as experience teaches us are liable to vary in the seedlings raised from one individual.

178. When a large number of the individuals of a species differ from the others in any striking particular they constitute a **Variety.** If the variety generally comes true from seed, it is often called a *Race.*

179. A *Variety* can only be propagated with certainty by grafts, cuttings, bulbs, tubers, or any other method which produces a new plant by the development of one or more buds taken from the old one. A *Race* may with care be propagated by seed, although seedlings will always be liable, under certain circumstances, to lose those particulars which distinguish it from the rest of the species. A real *Species* will always come true from seed.

180. The known species of plants (now near 100,000) are far too numerous for the human mind to study without classification, or even to give distinct single names to. To facilitate these objects, an admirable system, invented by Linnæus, has been universally adopted, viz. one common substantive name is given to a number of species which resemble each other more than they do any other species; the species so collected under one name are collectively called a **Genus** the common name being the *generic* name. Each species is then distinguished from the others of the same genus by the addition of an adjective epithet or *specific name.* Every species has thus a botanical name of two words. In Latin, the language usually used for the purpose, the first word is a substantive and designates the genus; the second, an adjective, indicates the species.

181. The genera thus formed being still too numerous (above 6,000) for study without further arrangement, they have been classed upon the same principles, viz. genera which resemble each other more than they do any other genera, have been collected together into groups of a higher degree called **Families** or **Natural Orders,** to each of which a common name has been given. This name is in Latin an adjective plural, usually taken from the name of some one *typical* genus, generally the best known, the first discovered, or the most marked (e. g. *Ranunculaceæ* from *Ranunculus*). This is however for the purpose of study and comparison. To speak of a species, to refer to it and identify it, all that is necessary is to give the generic and specific names.

182. Natural Orders themselves (of which we reckon near 200) are often in the same manner collected into **Classes;** and where Orders contain a large number of genera, or genera a large number of species, they require further classification. The genera of an Order are then collected into minor groups called *Tribes,* the species of a genus into *Sections,* and in a few cases this intermediate classification is carried still further. The names of these several groups the most generally adopted are as follows, beginning with the most comprehensive or highest :—

Classes.	Genera.
Subclasses or *Alliances.*	*Subgenera.*
Natural Orders or Families.	*Sections.*
Suborders.	*Subsections.*
Tribes.	Species.
Subtribes.	Varieties.
Divisions.	
Subdivisions.	

183. The characters (3) by which a species is distinguished from all other species of the same genus are collectively called the *specific* character of the plant; those by which its genus is distinguished from other genera of the Order, or its Order from other Orders, are respectively called the *generic* or *ordinal* character, as the case may be. The *habit* of a plant, of a species, a genus, etc., consists of such general characters as strike the eye at first sight, such as size, colour, ramification, arrangement of the leaves, inflorescence, etc., and are chiefly derived from the organs of vegetation.

184. Classes, Orders, Genera, and their several subdivisions, are called *natural* when, in forming them, all resemblances and differences are taken into account, valuing them according to their evident or presumed importance; *artificial,* when resemblances and differences in some one or very few particulars only are taken into account independently of all others.

185. The number of species included in a Genus, or the number of genera in an Order, is very variable. Sometimes two or three or even a single species may be so different from all others as to constitute the entire genus; in others, several hundred species may resemble each other so much as to be all included in one genus; and there is the same discrepancy in the number of genera to a Family. There is moreover, unfortunately, in a number of instances, great difference of opinion as to whether certain plants differing from each other in certain particulars are varieties of one species or belong to distinct species; and again, whether two or more groups of species should constitute as many sections of one genus, or distinct genera, or tribes of one Order, or even distinct Natural Orders. In the former case, as a species is supposed to have a real existence in nature, the question is susceptible of argument, and sometimes of absolute proof. But the place a group should occupy in the scale of degree is very arbitrary, being often a mere question of convenience. The more subdivisions upon correct principles are multiplied, the more they facilitate the study of plants, provided always the main resting-points for constant use, the Order and the Genus, are comprehensive and distinct. But if every group into which a genus can be divided be erected into a distinct genus, with a substantive name to be remembered whenever a species is spoken of, all the advantages derived from the beautiful simplicity of the Linnæan nomenclature are gone.

Chap. III. Vegetable Anatomy and Physiology.

§ 1. *Structure and Growth of the Elementary Tissues.*

186. If a very thin slice of any part of a plant be placed under a microscope of high magnifying power, it will be found to be made up of variously shaped and arranged ultimate parts, forming a sort of honeycombed structure. These ultimate parts are called *cells,* and form by their combination the *elementary tissues* of which the entire plant is composed.

187. A cell in its simplest state is a closed membranous sac, formed of a substance permeable by fluids, though usually destitute of visible pores. Each cell is a distinct individual, separately formed and separately acting, though cohering with the cells with which it is in contact, and partaking of the common life and action of the tissue of which it forms a part. The membranes separating or enclosing the cells are also called their *walls.*

188. Botanists usually distinguish the following tissues :—

(1) *Cellular tissue,* or *parenchyma,* consists usually of thin-walled cells, more or less round in form, or with their length not much exceeding

their breadth, and not tapering at the ends. All the soft parts of the leaves, the pith of stems, the pulp of fruits, and all young growing parts, are formed of it. It is the first tissue produced, and continues to be formed while growth continues, and when it ceases to be active the plant dies.

(2) *Woody tissue*, or *prosenchyma*, differs in having its cells considerably longer than broad, usually tapering at each end into points and overlapping each other. The cells are commonly thick-walled; the tissue is firm, tenacious, and elastic, and constitutes, the principal part of wood, of the inner bark, and of the nerves and veins of leaves, forming, in short, the framework of the plant.

(3) *Vascular tissue*, or the *vessels* or *ducts* of plants, so called from the mistaken notion that their functions are analogous to those of the vessels (veins and arteries) of animals. A *vessel* in plants consists of a vertical row of cells, which have their transverse partition-walls obliterated, so as to form a continuous tube. All phænogamous plants, as well as ferns and a few other cryptogamous plants, have vessels, and are therefore called *vascular plants*; so the majority of cryptogams having only cellular tissue are termed *cellular plants*. Vessels have their sides very variously marked; some called *spiral vessels*, have a spiral fibre coiled up their inside, which unrolls when the vessel is broken; others are marked with longitudinal slits, cross bars, minute dots or pits, or with transverse rings, The size of vessels is also very variable in different plants; in some they are of considerable size and visible to the naked eye in cross sections of the stem, in others they are almost absent or can only be traced under a strong magnifier.

189. Various modifications of the above tissues are distinguished by vegetable anatomists under names which need not be enumerated here as not being in general practical use. *Air-vessels*, *cysts*, *turpentine vessels*, *oil-reservoirs*, etc., are either cavities left between the cells, or large cells filled with peculiar secretions.

190. When tissues are once formed, they increase, not by the general enlargement of the whole of the cells already formed, but by *cell-division*, that is, by the division of young and vitally active cells, and the enlargement of their portions. In the formation of the embryo, the first cell of the new plant is formed, not by division, but around a segregate portion of the contents of a previously existing cell, the embryo-sac. This is termed *free cell-formation*, in contradistinction to cell-division.

191. A young and vitally active cell consists of the *outer wall*, formed of a more or less transparent substance called *cellulose*, permeable by fluids, and of ternary chemical composition (carbon, hydrogen, and oxygen); and of the *cell-contents*, usually viscid or mucilaginous, consisting of *protoplasm*, a substance of quaternary chemical composition (carbon, hydrogen, oxygen, and nitrogen), which fills an important part in cell-division and growth. Within the cell (either in the centre or excentrical) is usually a minute, soft, subgelatinous body called the *nucleus*, whose functions appear to be intimately connected with the first formation of the new cell. As this cell increases in size and its walls in thickness, the protoplasm and watery cell-sap become absorbed or dried up, the firm cellulose wall alone remaining as a permament fabric, either empty or filled with various organized substances produced or secreted within it.

192. The principal organized contents of cells are

sap, the first product of the digestion of the food of plants; it contains the elements of vegetable growth in a dissolved condition.

sugar, of which there are two kinds, called *cane-sugar* and *grape-sugar*. It usually exists dissolved in the sap. It is found abundantly in growing parts, in fruits, and in germinating seeds.

dextrine, or vegetable mucilage, a gummy substance, between mucilage and starch.

starch or *fecula*, one of the most universal and conspicuous of cell-contents, and often so abundant in farinaceous roots and seeds as to fill the cell-cavity. It consists of minute grains called *starch-granules*, which vary in size, and are marked with more or less conspicuous concentric lines. The chemical constitution of starch is the same as that of cellulose; it is unaffected by cold water, but forms a jelly with boiling water, and turns blue when tested by iodine.

chlorophyll, very minute granules, containing nitrogen, and coloured green under the action of sunlight. These granules are most abundant in the layers of cells immediately below the surface or epidermis of leaves and young bark. The green colouring matter is soluble in alcohol, and may thus be removed from the granules.

chromule, a name given to a similar colouring-matter when green,

wax, *oils*, *camphor*, and *resinous* matter, are common in cells or in cavities in the tissues between the cells, also various mineral substances either in an amorphous state or as microscopic crystals, when they are called *Raphides*.

§ 2. *Arrangement of the Elementary Tissues, or Structure of the Organs of Plants.*

193. Leaves, young stems, and branches, and most parts of phænogamous plants, during the first year of their existence, consist anatomically of

1, a *cellular system*, or continuous mass of cellular tissue, which is developed both vertically as the stem or other parts increase in length, and horizontally or laterally as they increase in thickness or breadth. It surrounds or is intermixed with the fibro-vascular system, or it may exist alone in some parts of phænogamous plants, as well as in cryptogamous ones.

2, a *fibro-vascular system*, or continuous mass of woody and vascular tissue, which is gradually introduced vertically into, and serves to bind together the cellular system. It is continued from the stem into the petioles and veins of the leaves, and into the pedicels and parts of the flowers, and is never wholly wanting in any phænogamous plant.

3, an *epidermis*, or outer skin, formed of one or more layers of flattened (horizontal), firmly coherent, and usually empty cells, with either thin and transparent or thick and opaque walls. It covers almost all parts of plants exposed to the outward air, protecting their tissues from its immediate action, but is wanting in those parts of aquatic plants which are constantly submerged.

194. The epidermis is frequently pierced by minute spaces between the cells, called *Stomates*. They are oval or mouth-shaped, bordered by *lips*, formed of two or more elastic cells so disposed as to cause the stomate to open in a moist, and to close up in a dry state of the atmosphere. They communicate with intercellular cavities, and are obviously designed to regulate evaporation and respiration. They are chiefly found upon leaves, especially on the under surface.

195. When a phænogamous plant has outlived the first season of its growth, the anatomical structure of its stem or other perennial parts becomes more complicated and very different in the two great classes of phænogamous plants called *Exogens* and *Endogens*, which correspond with very few exceptions to the two classes Dicotyledons and Monocotyledons (167), founded on the structure of the embryo. In Exogens (Dicotyledons) the woody system is placed in concentric layers between a central *pith* (198, 1), and an external separable *bark* (198, 5.) In Endogens (Monocotyledons) the woody system is in separate small bundles or fibres running through the cellular system without apparent order, and there is usually no distinct central pith, nor outer separable bark.

196. The anatomical structure is also somewhat different in the different organs of plants. In the **Root**, although it is constructed generally on the same plan as the stem, yet the regular organization, and the difference between Exogens and Endogens, is often disguised or obliterated by irregularities of growth, or by the production of large quantities of cellular tissue filled with starch or other substances (192). There is seldom, if ever, any distinct pith, the concentric circles of fibro-vascular tissue in Exogens are often very indistinct or have no relation to seasons of growth, and the epidermis has no stomates.

197. In the **Stem** or branches, during the first year or season of their growth, the difference between Exogens and Endogens is not always very conspicuous. In both there is a tendency to a circular arrangement of the fibro-vascular system, leaving the centre either vacant or filled with cellular tissue (pith) only, and a more or less distinct outer rind is observable even in several Endogens. More frequently, however, the distinction is already very apparent the first season, especially towards its close. The fibro-vascular bundles in Endogens usually anastomose but little, passing continuously into the branches and leaves. In Exogens the circle of fibro-vascular bundles forms a more continuous cylinder of network emitting lateral offsets into the branches and leaves.

198. The Exogenous stem, after the first year of its growth, consists of

1, the *pith*, a cylinder of cellular tissue, occupying the centre or longitudinal axis of the stem. It is active only in young stems or branches, becomes dried up and compressed as the wood hardens, and often finally disappears, or is scarcely distinguishable in old trees.

2, the *medullary sheath*, which surrounds and encases the pith. It abounds in spiral vessels (188, 3), and is in direct connection when young, with the leaf-buds and branches, with the petioles and veins of leaves, and other ramifications of the system. Like the pith, it gradually disappears in old wood.

3, the *wood*, which lies immediately outside the medullary sheath. It is formed of woody tissue (188, 2), through which, in most cases, vessels (188, 3) variously disposed are interspersed. It is arranged in annual concentric circles (211), which usually remain active during several years, but in older stems the central and older layers become hard, dense, comparatively inactive, and usually deeper coloured, forming what is called *heart-wood* or *duramen*, the outer, younger, and usually paler-coloured living layers constituting the *sapwood* or *alburnum*.

4, the *medullary rays*, which form vertical plates, originating in the pith, and, radiating from thence, traverse the wood and terminate in the bark. They are formed of cellular tissue, keeping up a communication between the living portion of the centre of the stem and its outer surface. As the heart-wood is formed, the inner portion of the medullary rays ceases to be active, but they usually may still be seen in old wood, forming what carpenters call the *silver grain*.

5, the *bark*, which lies outside the wood, within the epidermis. It is, like the wood, arranged in annual concentric circles (211), of which the outer older ones become dry and hard, forming the *corky layer* or *outer bark*, which, as it is distended by the thickening of the stem, either cracks or is cast off with the epidermis, which is no longer distinguishable. Within the corky layer is the *cellular*, or *green*, or *middle bark*, formed of loose thin walled pulpy cells containing chlorophyll (192); and which is usually the layer of the preceding season. The innermost and youngest circle, next the young wood, is the *liber* or *inner bark*, formed of long tough woody tissue called *bast-cells*.

199. The Endogenous stem, as it grows old, is not marked by the concentric circles of Exogens. The wood consists of a *matrix* of cellular tissue irregularly traversed by vertical cords or bundles of woody and vascular tissue, which are in connection with the leaves. These vascular bundles change in structure and direction as they pass down the stem, losing their vessels, they retain only their bast or long wood cells, usually curving outwards towards the rind. The old wood becomes more compact and harder towards the circumference than in the centre. The epidermis or rind either hardens so as to prevent any increase of diameter in the stem, or it distends, without increasing in thickness or splitting or casting off any outer layers.

200. In the **Leaf**, the structure of the petioles and principal ribs or veins is the same as that of the young branches of which they are ramifications. In the expanded portion of the leaf the fibro-vascular system becomes usually very much ramified, forming the smaller veins. These are surrounded and the interstices filled up by a copious and very active cellular tissue. The majority of leaves are horizontal, having a differently constructed upper and under surface. The cellular stratum forming the upper surface consists of closely set cells, placed vertically, with their smallest ends next the surface, and with few or no stomates in the epidermis. In the stratum forming the under surface, the cells are more or less horizontal, more loosely placed, and have generally empty spaces between them, with stomates in the epidermis communicating with these intercellular spaces. In vertical leaves (as in a large number of Australian plants) the two surfaces are nearly similar in structure.

201. When leaves are reduced to scales, acting only as protectors of young buds, or without taking any apparent part in the economy of vegetable life, their structure, though still on the same plan, is more simple; their fibro-vascular system is less ramified, their cellular system more uniform, and there are few or no stomates.

202. Bracts and floral envelopes, when green and much developed, resemble leaves in their anatomical structure, but in proportion as they are reduced to scales or transformed into petals, they lose their stomates, and their systems, both fibro-vascular and the cellular, become more simple and uniform or more slender and delicate.

203. In the stamens and pistils the structure is still nearly the same. The fibro-vascular system surrounded by and intermixed with the cellular tissue, is usually simple in the filaments and style, more or less ramified in the flattened or expanded parts, such as the anther cases, the walls of the ovary, or carpellary leaves, etc. The pollen consists of granular cells variously shaped, marked, or combined, peculiar forms being constant in the same species, or often in large genera, or even Orders. The stigmatic portion of the pistil is a mass of loosely cellular substance, destitute of epidermis, and usually is in communication with the ovary by the channel running down the centre of the style.

204. Tubers, fleshy thickening of the stem or other parts of the plant, succulent leaves or branches, the fleshy, woody, or bony parts of fruits, the albumen, and the thick fleshy parts of embryos, consist chiefly of largely developed cellular tissue, replete with starch or other substances (192), deposited apparently in most cases for the eventual future use of the plant or its parts when recalled into activity at the approach of a new season.

205. Hairs (171) are usually expansions or processes of the epidermis, and consist of one or more cells placed end to end. When thick or hardened into prickles, they still consist usually of cellular tissue only. Thorns (170) contain more or less of a fibro-vascular system, according to their degree of development.

206. Glands, in the primary sense of the word (175, 1), consist usually of a rather loose cellular tissue without epidermis, and often replete with resinous or other substances.

§ 3. *Growth of the Organs.*

207. Roots grow in length constantly and regularly at the extremities only of their fibres, in proportion as they find the requisite nutriment. They form no buds containing the germ of future branches, but their fibres proceed irregularly from any part of their surface without previous indication, and when their growth has been stopped for a time, either wholly by the close of the season, or partially by a deficiency of nutriment at any particular spot, it will, on the return of favourable circumstances, be resumed at the same point, if the growing extremities be uninjured. If during the dead season, or at any other time, the growing extremity is cut off, dried up, or otherwise injured, or stopped by a rock or other obstacle opposing its progress, lateral fibres will be formed on the still living portion; thus enabling the root as a whole to diverge in any direction, and travel far and wide when lured on by appropriate nutriment.

208. This growth is not however by the successive formation of terminal cells attaining at once their full size. The cells first formed on a fibre commencing or renewing its growth, will often dry up and form a kind of terminal cap, which is pushed on as cells are formed immediately under it; and the new cells, constituting a greater or lesser portion of the ends of the fibres, remain some time in a growing state before they have attained their full size.

209. The roots of Exogens, when perennial, increase in thickness like stems by the addition of concentric layers, but these are usually much less distinctly marked; and in a large number of perennial Exogens and most Endogens the roots are annual, perishing at the close of the season, fresh adventitious roots springing from the stock when vegetation commences the following season.

210. The stem, including its branches and appendages (leaves, floral organs, etc.), grows in length by additions to its extremity, but a much greater proportion of the extremity and branches remains in a growing and expanding state for a much longer time than in the case of the root. At the close of one season, leaf-buds or seeds are formed, each containing the germ of a branch or young plant to be produced the following season. At a very early stage of the development of these buds or seeds, a commencement may be found of many of the leaves it is to bear; and before a leaf unfolds, every leaflet of which it is so consist, every lobe or tooth which is to mark its margin, may often be traced in miniature, and thenceforth till it attains its full size, the branch grows and expands in every part. In some cases however the lower part of a branch and more rarely (e. g. in some *Meliaceæ*) the lower part of a compound leaf attains its full size before the young leaves or leaflets of the extremity are yet formed.

211. The perennial stem, if exogenous (198), grows in thickness by the addition every season of a new layer or ring of wood between the outermost preceding layer and the inner surface of the bark, and by the formation of a new layer or ring of bark within the innermost preceding layer and outside the new ring of wood, thus forming a succession of concentric circles. The sap elaborated by the leaves finds its way, in a manner not as yet absolutely ascertained, into the *cambium-region*, a zone of tender thin-walled cells connecting the wood with the bark, by the division and enlargement of which new cells (190) are formed. These cells separate in layers, the inner ones constituting the new ring of wood, and the outer ones the new bark or liber. In most exogenous trees, in temperate climates, the seasons of growth correspond with the years, and the rings of wood remain sufficiently distinct to indicate the age of the tree; but in many tropical and some evergreen trees, two or more rings of wood are formed in one year.

212. In endogenous perennial stems (192), the new wood or woody fibre is formed towards the centre of the stem, or irregularly mingle with the old. The stem consequently either only becomes more dense without increasing in thickness, or only increases by gradual distention, which is never very considerable. It affords therefore no certain criterion for judging of the age of the tree.

213. Flowers have generally all their parts formed, or indicated by protuberances or growing cells at a very early stage of the bud. These parts are then usually more regularly placed than in the fully developed flower. Parts which afterwards unite are then distinct; many are present in this rudimentary state which are never further developed, and parts which are afterwards very unequal or dissimilar are perfectly alike at this early period. On this account flowers in this very early stage are supposed by some modern obtanists to be more *round*, that is, more in conformity to a supposed type; and the study of the early formation and growth of the floral organs, called *Organogenesis*, has been considered essential for the correct appreciation of the affinities of plants. In some cases, however, it would appear that modifications of development, not to be detected in the very young bud, are yet of great importance in the distinction of large groups of plants, and that *Organogenesis*, although it may often assist in clearing up a doubtful point of affinity, cannot nevertheless be exclusively relied on in estimating the real value of peculiarities of structure.

214. The flower is considered as a *bud* (*flower-bud*, *alabastrum*) until the perianth expands, the *period of flowering* (*anthesis*) is that which elapses from the first expanding of the perianth, till the pistil is set or begins to enlarge, or, when it does not set, until the stamens and pistil wither or fall. After that, the enlarged ovary takes the name of *young fruit*.

215. At the close of the season of growth, at the same time as the leaf-buds or seeds are formed containing the germ of future branches or plants, many plants form also, at or near the bud or seed, large deposits, chiefly of starch. In many cases,—such as the tubers of a potato or other root-stock, the scales or thickened base of a bulb, the albumen or the thick cotyledons of a seed,—this deposit appears to be a store of nutriment, which is partially absorbed by the young branch or plant during its first stage of growth, before the roots are sufficiently developed to supply it from without. In some cases, however, such as the fleshy thickening of some stems or peduncles, the pericarps of fruits which perish long before *germination* (the first growth of the seed), neither the use nor the cause of these deposits has as yet been clearly explained.

§ 4. *Functions of the Organs.*

216. The functions of the Root are,—1. To fix the plant in or to the soil or other substance on which it grows. 2. To absorb nourishment from the soil, water, or air, into which the fibres have penetrated (or from other plants in the case of parasites), and to transmit it rapidly to the stem. The absorption takes places through the young growing extremities of the fibres, and through a peculiar kind of hairs or absorbing organs which are formed at or near those growing extremities. The transmission to the stem is through the tissues of the root itself. The nutriment absorbed consists chiefly of carbonic acid and nitrogen or nitrogenous compounds dissolved in water. 3. In some cases roots secrete or exude small quantities of matter in a manner and with a purpose not satisfactorily ascertained.

217. The stem and its branches supports the leaves, flowers and fruit, transmit the crude sap, or nutriment absorbed by the roots and mixed with previously organized matter, to the leaves, and transmit the assimilated or elaborated sap from the leaves to the growing parts of the plant, to be there used up, or to form deposits for future use (204). The transmission of the ascending crude sap appears to take place chiefly through the elongated cells associated with the vascular tissues, passing from one cell to another by a process but little understood, but known by the name of *endosmose*.

218. Leaves are functionally the most active of the organs of vegetation. In them is chiefly conducted digestion or *Assimilation*, a name given to the process which accomplishes the following results:—1. The chemical decomposition of the oxygenated matter of the sap, the absorption of carbonic acid, and the liberation of pure oxygen at the ordinary temperature of the air. 2. A counter-operation by which oxygen is absorbed from the atmosphere and carbonic acid is exhaled. 3. The transformation of the residue of the crude sap into the organized substances which enter into the composition of the plant. The exhalation of oxygen appears to take place under the influence of solar heat and light, chiefly from the under surface of the leaf, and to be in some measure regulated by the stomates; the absorption of oxygen goes on always in the dark, and in the daytime also in certain cases. The transformation of the sap is effected within the tissues of the leaf, and continues probably more or less throughout the active parts of the whole plant.

219. The Floral Organs seldom contribute to the growth of the plant on which they are produced; their functions are wholly concentrated on the formation of the seed with the germ of a future plant.

220. The Perianth (calyx and corolla) acts in the first instance in protecting the stamens and pistils during the early stages of their development. When expanded, the use of the brilliant colours which they often display, of the sweet or strong odours they emit, has not been adequately explained. Perhaps they may have great influence in attracting those insects whose concurrence has been shown in many cases to be necessary for the due transmission of the pollen from the anther to the stigma.

221. The pistil, when stimulated by the action of the pollen, forms and nourishes the young seed. The varied and complicated contrivances by which the pollen is conveyed to the stigma, whether by elastic action of the organs themselves, or with the assistance of wind, of insects, or other extraneous agents, have been the subject of numerous observations and experiments of the most distinguished naturalists, and are yet far from being fully investigated. Their details, however, as far as known, would be far too long for the present outline.

222. The fruit nourishes and protects the seed until its maturity, and then often promotes its dispersion by a great variety of contrivances or apparently collateral circumstances, *e. g.* by an elastic dehiscence which casts the seed off to a distance; by the development of a pappus, wings, hooked or

other appendages, which allows them to be carried off by winds, or by animals, etc., to which they may adhere; by their small specific gravity, which enables them to float down streams; by their attractions to birds, etc., who taking them for food, drop them often at great distances, etc. Appendages to the seeds themselves also often promote dispersion.

223. Hairs have various functions. The ordinary indumentum (171) of stems and leaves indeed seems to take little part in the economy of the plant besides perhaps some occasional protection against injurious atmospheric influences, but the root hairs (216) are active absorbents, the hairs on styles and other parts of flowers appear often materially to assist the transmission of pollen, and the exudations of glandular hairs (175,2) are often too copious not to exercise some influence on the phenomena of vegetation. The whole question, however, of vegetable exudations and their influence on the economy of vegetable life, is as yet but imperfectly understood.

Chap. IV. Collection, Preservation, and Determination of Plants.

224. Plants can undoubtedly be most easily and satisfactorily examined when freshly gathered. But time will rarely admit of this being done, and it is moreover desirable to compare them with other plants previously observed or collected. *Specimens* must, therefore, be selected for leisurely observation at home, and preserved for future reference. A collection of such specimens constitutes a *Herbarium*.

225. A botanical **Specimen**, to be perfect, should have *root*, *stem*, *leaves*, *flowers* (both open and in bud) and *fruit* (both young and mature). It is not, however, always possible to gather such complete specimens, but the collector should aim at completeness. Fragments such as leaves without flowers, or flowers without leaves, are of little or no use.

226. If the plant is small (not exceeding 15 in.) or can be reduced to that length by folding, the specimen should consist of the whole plant, including the principal part of the root. If it be too large to preserve the whole, a good flowering branch should be selected, with the foliage as low down as can be gathered with it; and one or two of the lower stem-leaves or radical leaves, if any, should be added, so as to preserve as much as possible of the peculiar aspect of the plant.

227. The specimens should be taken from healthy uninjured plants of a medium size. Or if a specimen be gathered because it looks a little different from the majority of those around it, apparently belonging to the same species, a specimen of the more prevalent form should be taken from the same locality for comparison.

228. For bringing the specimens home, a light portfolio of pasteboard, covered with calico or leather, furnished with straps and buckles for closing, and another for slinging on the shoulder, and containing a few sheets of stout coarse paper, is better than the old-fashioned tin box (except, perhaps, for stiff prickly plants and a few others). The specimens as gathered are placed between the leaves of paper, and may be crowded together if not left long without sorting.

229. If the specimen brought home be not immediately determined when fresh, but dried for future examination, a note should be taken of the time, place, and situation in which it was gathered; of the stature, habit, and other particulars relating to any tree, shrub, or herb of which the specimen is only a portion; of the kind of root it has; of the colour of the flower; or of any other particulars which the specimen itself cannot supply, or which may be lost in the process of drying. These memoranda, whether taken down in the field or from the living specimen when brought home, should be written on a label attached to the specimen or preserved with it.

230. To dry specimens, they are laid flat between several sheets of bibulous paper, and subjected to pressure. The paper is subsequently changed at intervals, until they are dry.

231. In laying out the specimen, care should be taken to preserve the natural position of the parts as far as consistent with the laying flat In general, if the specimen is fresh and not very slender, it may be simply laid on the lower sheet, holding it by the stalk and drawing it slightly downwards; then, as the upper sheet is laid over, if it be slightly drawn downwards as it is pressed down, it will be found, after a few trials, that the specimen will have retained a natural form with very little trouble. If the specimen has been gathered long enough to have become flaccid, it will require more care in laying the leaves flat and giving the parts their proper direction. Specimens kept in tin boxes will also often have taken unnatural bends which will require to be corrected.

232. If the specimen is very bushy, some branches must be thinned out, but always so as to show where they have been. If any part, such as the head of a thistle, the stem of an *Orobanche*, or the bulb of a Lily, be very thick, a portion of what is to be the under side of the specimen may be sliced off. Some thick specimens may be split from top to bottom before drying.

233. If the specimen be succulent or tenacious of life, such as a *Sedum* or an *Orchis*, it may be dipped in boiling water *all but the flowers*. This will kill the plant at once, and enable it to be dried rapidly, losing less of its colour or foliage than would otherwise be the case. Dipping in boiling water is also useful in the case of Heaths and other plants which are apt to shed their leaves during the process of drying.

234. Plants with very delicate corollas may be placed between single leaves of very thin unglazed tissue-paper. In shifting these plants, into dry paper the tissue-paper is not to be removed, but lifted with its contents on to the dry paper.

235. The number of sheets of paper to be placed between each specimen or sheet of specimens, will depend, on the one hand, on the thickness and humidity of the specimens; on the other hand, on the quantity and quality of the paper one has at command. The more and the better the paper the less frequently will it be necessary to change it, and the sooner the plants will dry. The paper ought to be coarse, stout, and unsized. Common blotting-paper is much too tender.

236 Care must be taken that the paper used is well dried. If it be likewise hot, all the better; but it must then be very dry; and wet plants put into hot paper will require changing very soon, to prevent their turning black, for hot damp without ventilation produces fermentation, and spoils the specimens.

237. For pressing plants, various more or less complicated and costly presses are made. None is better than a pair of boards the size of the paper, and a stone or other heavy weight upon them if at home, or a pair of strong leather straps round them if travelling. Each of these boards should be double, that is, made of two layers of thin boards, the opposite way of the grain, and joined together by a row of clenched brads round the edge, without glue. Such boards, in deal, rather less than half an inch thick (each layer about 2½ lines) will be found light and durable.

238. It is useful also to have extra boards or pasteboards the size of the paper, to separate thick plants from thin ones, wet ones from those nearly dry, etc. Open wooden frames with cross-bars, or frames of strong wire-work lattice, are still better than boards for this purpose, as accelerating the drying by promoting ventilation.

239. The more frequently the plants are shifted into dry paper the better. Excepting for very stiff or woody plants, the first pressure should be light, and the first shifting, if possible, after a few hours. Then, or at the second shifting, when the specimens will have lost their elasticity, will be the time for putting right any part of a specimen which may have taken a wrong fold or a bad direction. After this the pressure may be gradually increased, and the plants left from one to several days without shifting. The exact amount of pressure to be given will depend on the consistence of the specimens, and the amount of paper. It must only be borne in mind that too much pressure crushes the delicate parts, too little allows them to shrivel, in both cases interfering with their future examination.

240. The most convenient specimens will be made, if the drying paper is the same size as that of the herbarium in which they are to be kept. That of writing demy, rather more than 16 inches by 10½ inches, is a common and very convenient size. A small size reduces the specimens too much, a large size is both costly and inconvenient for use.

241. When the specimens are quite dry and siiff, they may be packed up in bundles with a single sheet of paper between each layer, and this paper need not be bibulous. The specimens may be placed very closely on the sheets, but not in more than one layer on each sheet, and care must be taken to protect the bundles by sufficient covering from the effects of external moisture or the attacks of insects.

242. In laying the specimens into the herbarium, no more than one species should ever be fastened on one sheet of paper, although several specimens of the same species may be laid side by side. And throughout the process of drying, packing, and lying in, great care must be taken that the labels be not separated from the specimens they belong to.

243 To examine or dissect flowers or fruits in dried specimens it is necessary to soften them. If the parts are very delicate, this is best done by gradually moistening them in cold water ; in most cases, steeping them in boiling water or in steam is much quicker. Very hard fruits and seeds will require boiling to be able to dissect them easily.

244. For dissecting and examining flowers in the field, all that is necessary is a penknife and a pocket-lens of two or three glasses from 1 to 2 inches focus. At home it is more convenient to have a mounted lens or simple microscope, with a stage holding a glass plate, upon which the flowers may be laid ; and a pair of dissectors, one of which should be narrow and pointed, or a mere point, like a thick needle, in a handle ; the other should have a pointed blade, with a sharp edge, to make clean sections across the ovary. A compound microscope is rarely necessary, except in cryptogamic botany and vegetable anatony. For the simple microscope, lenses of ¼, ½, 1, and 1½ inches focus are sufficient.

245. To assist the student in *determining* or ascertaining the name of a plant belonging to a Flora, analytical tables should be prefixed to the Orders, Genera, and Species. These tables should be so constructed as to contain, under each bracket, or equally indented, two (rarely three or more) alternatives as nearly as possible contradictory or incompatible with each other, each alternative referring to another bracket, or having under it another pair of alternatives further indented. The student having a plant to determine, will first take the general table of Natural Orders, and examining his plant at each step to see which alternative agrees with it, will be led on to the Order to which it belongs ; he will then compare it with the detailed character of the Order given in the text. If it agrees, he will follow the same course with the table of the genera of that Order, and again with the table of species of the genus. But in each case, if he finds that his plant does not agree with the detailed description of the genus or species to which he has thus been referred, he must revert to the beginning and carefully go through every step of the investigation before he can be satisfied. A fresh examination of his specimen, or of others of the same plant, a critical consideration of the meaning of every expression in the characters given, may lead him to detect some minute point overlooked or mistaken, and put him into the right way. Species vary within limits which it is often very difficult to express in words, and it proves often impossible, in framing these analytical tables, so to divide the genera and species, that those which come under one alternative should absolutely exclude the others. In such doubtful cases both alternatives must be tried before the student can come to the conclusion that his plant is not contained in the Flora, or that it is erroneously described.

246. In those Floras where analytical tables are not given, the student is usually guided to the most important or prominent characters of each genus or species, either by a general summary prefixed to the genera of an Order or to the species of the genus, for all such genera or species ; or by a special summary immediately preceding the detailed description of each genus or species. In the latter case this summary is called a *diagnosis*. Or sometimes the important characters are only indicated by italicizing them in the detailed description.

247. It may also happen that the specimen gathered may present some occasional or accidental anomalies peculiar to that single one, or to a very few individuals, which may prevent the species from being at once recognized by its technical characters. It may be useful here to point out a few of these anomalies which the botainst may be most likely to meet with. For this purpose we may divide them into two classes, viz. :

(1.) *Aberrations from the ordinary type or appearance of a species for which some general cause may be assigned.*

A bright, light, and open situation, particularly at considerable elevations above the sea, or at high latitudes, without too much wet or drought, tends to increase the size and heighten the colour of flowers, in proportion to the stature and foliage of the plant.

Shade, on the contrary, especially if accompanied by richness of soil and sufficient moisture, tends to increase the foliage and draw up the stem, but to diminish the number, size, and colour of the flowers.

A hot climate and dry situation tend to increase the hairs, prickles, and other productions of the epidermis, to shorten and stiffen the branches, rendering thorny plants yet more spinous. Moisture in a rich soil has a contrary effect.

The neighbourhood of the sea, or a saline soil or atmosphere, imparts a thicker and more succulent consistence to the foliage and almost every part of the plant, and appears not unfrequently to enable plants usually annual to live through the winter. Flowers in a maritime variety are often much fewer, but not smaller.

The luxuriance of plants growing in a rich soil, and the dwarf stunted character of those crowded in poor soils, are too well known to need particularizing. It is also an every day observation how gradually the specimens of a species become dwarf and stunted as we advance into the cold damp regions of the summits of high mountain ranges, or into high northern latitudes ; and yet it is frequently from the want of attention to these circumstances that numbers of false species have been added to our Enumerations and Floras. Luxuriance entails not only increase of size to the whole plant, or of particular parts, but increase of number in branches, in leaves, or leaflets of a compound leaf ; or it may diminish the hairiness of the plant, induce thorns to grow out into branches, etc.

Capsules which, while growing, lie close upon the ground, will often become larger, more succulent, and less readily dehiscent, than those which are not so exposed to the moisture of the soil.

Herbs eaten down by sheep or cattle, or crushed underfoot, or otherwise checked in their growth, or trees or shrubs cut down to the ground, if then exposed to favourable circumstances of soil and climate, will send up luxuriant side shoots, often so different in the form of their leaves, in their ramification and inflorescence, as to be scarcely recognizable for the same species.

Annuals which have germinated in spring and flowered without check, will often be very different in aspect from individuals of the same species, which having germinated later, are stopped by summer droughts or the approach of winter, and only flower the following season upon a second growth. The latter have often been mistaken for perennials.

Hybrids, or crosses between two distinct species, come under the same category of anomalous specimens from a known cause. Frequent as they are in gardens, where they are artificially produced, they are probably rare in nature, although on this subject there is much diversity of opinion, some believing them to be very frequent, others almost denying their existence. Absolute proof of the origin of a plant found wild, is of course impossible ; but it is pretty generally agreed that the following particulars must always co-exist in a *wild hybrid*. It partakes of the characters of its two parents ; it is to be found isolated, or almost isolated, in places where the two parents are abundant ; if there are two or three, they will generally be dissimilar from each other, one partaking more of one parent, another of the other ; it seldom ripens good seed ; it will never be found where one of the parents grows alone.

Where two supposed species grow together, intermixed with numerous intermediates bearing good seed, and passing more or less gradually from the one to the other, it may generally be concluded that the whole are mere varieties of one species. The beginner, however, must be very cautious not to

set down a specimen as intermediate between two species, because it appears to be so in some, even the most striking characters ; such as stature and foliage. Extreme varieties of one species are connected together by transitions in all their characters, but these transitions are not all observable in the same specimens. The observation of a single intermediate is therefore of little value, unless it be one link in a long series of intermediate forms, and, when met with, should lead to the search for the other connecting links.

(2.) *Accidental aberrations from the ordinary type, that is, those of which the cause is unknown.*

These require the more attention, as they may sometimes lead the beginner far astray in his search for the genus, whilst the aberrations above-mentioned, as reducible more or less to general laws, affect chiefly the distinction of species.

Almost all species with coloured flowers are liable to occur occasionally with them all white.

Many may be found even in a wild state with double flowers, that is, with a multiplication of petals.

Plants which have usually conspicuous petals will occasionally appear without any at all, either to the flowers produced at particular seasons, or to all the flowers of individual plants, or the petals may be reduced to narrow slips.

Flowers usually very irregular, may, on certain individuals, lose more or less of their irregularity, or appear in some very different shape. Spurs, for instance, may disappear, or be produced on all instead of one only of the petals.

One part may be occasionally added to, or subtracted from, the usual number of parts in each floral whorl, more especially in regular polypetalous flowers.

Plants usually monœcious or diœcious may become occasionally hermaphrodite, or hermaphrodite plants may produce occasionally unisexual flowers by the abortion of the stamens or of the pistils.

Leaves cut or divided where they are usually entire, variegated or spotted where they are usually of one colour, or the reverse, must also be classed amongst those accidental aberrations which the botanist must always be on his guard against mistaking for specific distinctions.

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FORESTER'S MANUAL OF BOTANY
FOR SOUTHERN INDIA.

This Manual is drawn up to assist Forest Officers in the determination of the trees of their districts, and will only treat of the trees and large shrubs; herbaceous plants shrubs attaining no size and creepers will not be described, and Orders or Genera only containing such (as for instance Ranunculace and Ranunculus) will be excluded.

CLASS I.—DICOTYLEDONS.

First rudimentary leaves of the embryo opposite, leaves irregularly net veined. Stem consisting of a pith in the centre and of concentric circles containing fibrous tissue increasing indefinitely by additions to the outside, and of bark on the outside; calyx and corol usually tetramerous or pentamerous.

The above characters are all that are constant to separate Dicotyledons from Monocotyledons, these two great classes have however each a peculiar habit which is easily recognized. All Indian trees or shrubs except Palms, Screw pines and Bamboos are Dicotyledons.

SUB-CLASS I.—POLYPETALÆ.

Petals distinct rarely wanting or connate at the base.

COHORT I. RANALES.—*Stamens indefinite, hypogynous, carpels distinct free or immersed singly in the torus, rarely connate below, albumen usually copious embryo relatively small.*

i. DILLENIACEÆ.—Leaves alternate simple exstipulate often scabrid, stipules none, sepals persistent, seeds arillate.

1 Dillenia. 2 Wormia.

ii. MAGNOLIACEÆ.—Sepals and petals forming three or more series and imbricate in each series. Carpel indefinite.

3. Michelia.

iii. ANONACEÆ.—Leaves alternate entire exstipulate, calyx and corol trimerous, carpels generally indefinite rarely definite or solitary, albumen ruminate.

4 Sagerœa. 8 Anona. 12 Polyalthia. 15 Miliusa.
5 Popowia. 9 Xylopia. 13 Phœanthus. 16 Alphonsea.
6 Goniothalamus. 10 Cyathocalyx. 14 Saccopetalum. 17 Orophea.
7 Mitrephora. 11 Unona.

iv. MENISPERMACEÆ.—Leaves alternate exstipulate usually palminerved, flowers small diœcious, stamens 6 (3-9) free or connate.

18 Cocculus.

v. BERBERIDACEÆ.—Leaves pinnate or unifoliate, sepals petals and stamens each in 2 or 3 series of 3 each, anthers dehiscing by valves, carpel 1.

19 Berberis.

COHORT II. PARIETALES.—*Stamens definite or indefinite hypogynous, ovary syncarpous with parietal placentation, one celled or spuriously divided by cellular placentary dissepiments, ovules rarely solitary.*

vi. CAPPARIDACEÆ.—Leaves alternate simple or multifoliate, stipules often aculeate, petals 4, stamens indefinite rarely definite ovary often stipitate, albumen none.

20 Capparis. 21 Cratœva.

vii. MORINGACEÆ.—Leaves 2-3-pinnate alternate, stamens 5 or 10, albumen none.

22 Moringa.

viii. BIXINEÆ.—Leaves alternate simple, stipules none or minute (rarely conspicuous.)

23 Cochlospermum. 25 Flacourtia. 27 Aberia.
24 Scolopia. 26 Hydnocarpus. 28 Erythrospermum.
29 Trichadenia.

COHORT III. POLYGALINEÆ.—*Sepals 5 unequal or equal, petals 5 stamens 5 6 or 8 free or monadelphous hypogynous, ovary 2 merous.*

ix. PITTOSPOREÆ.—Leaves alternate entire exstipulate, flowers regular.

30 Pittosporum.

x. POLYGALEÆ.—Leaves alternate entire, exstipulate, flowers irregular.

31 Xanthophyllum.

COHORT IV. CARYOPHYLLINEÆ.—*Sepals 2-4-5 free or connate, petals 5 rarely fewer or none occasionally minute, stamens 5-10 or many hypogynous, ovary 1 celled with free central or more or less septate placentation, albumen mealy.*

xi. TAMARISCINEÆ.—Slenderly branched with minute or rudimentary alternate leaves, sepals and petals each 4-6.

32 Tamarix.

COHORT V. GUTTIFERALES.—*Sepals* 2-6 *or more imbricate, petals as many rarely more, stamens indefinite hypogynous, ovary usually syncarpous with axile placentation.*

xii. GUTTIFERÆ.—Usually abounding in a yellow or greenish resinous juice, leaves opposite entire, flowers usually diœcious, or polygamous, stamens indefinite free or variously connate.

33 Garcinia. 34 Xanthochymus. 35 Calophyllum. 36 Mesua. 37 ~~Mammea.~~

xiii. TERNSTRÆMIACEÆ.—Leaves alternate rarely opposite? simple, flowers hermathrodite, stamens indefinite free or connate at the base.

38 Ternstræmia. 39 Adinandra. 40 Eurya 41 Gordonia. 42 Pœciloneuron.

xiv. DIPTEROCARPEÆ.—Leaves alternate entire penniveined, flowers hermathrodite, calyx lobes usually enlarged in fruit.

43 Dipterocarpus. 44 Vatica. 45 Shorea. 46 Hopea. 47 Doona. 48 Vateria. 49 Monoporandra.

COHORT VI. MALVALES.—*Sepals or calyx lobes valvate, petals as many as sepals or none, stamens monadelphous or free hypogynous ovary syncarpous with axile placentation.*

xv. MALVACEÆ.—Leaves alternate, stamens monadelphous with 1 celled anthers.

50 Kydia. 51 Julostyles. 52 Dicellostyles. 53 Thespesia. 54 Adansonia. 55 Bombax. 56 Eriodendron. 57 Cullenia.

xvi. STERCULIACEÆ.—Leaves alternate, stamens monadelphous, indefinite or definite, or free and definite with or without alternating staminodia, anthers 2 celled.

58 Sterculia. 59 Heritiera. 60 Kleinhovia. 61 Pterospermum. 62 Eriolæna. 63 Abroma. 64 Guazuma.

xvii. TILIACEÆ.—Leaves alternate, stamens indefinite free or shortly connate at the base, anthers 2 celled.

65 Pityranthe. 66 Berrya. 67 Grewia. 68 Erinocarpus. 69 Elæocarpus.

COHORT VII. GERANIALES.—*Ovary more or less deeply sulcate or lobed, or entire (in Lineæ Burseraceæ Meliaceæ and Chailletiaceæ) stamens hypogynous, ovules* 1-2 *or rarely indefinite pendulous with a ventral raphe.*

xviii. LINEÆ.—Leaves simple alternate, ovary undivided, styles free or connate, ovules 1 or 2 in each cell.

70 Erythroxylon.

xix. GERANIACEÆ.—Leaves alternate or opposite usually stipulate not pellucid dotted, stamens 5-10-15 all or only part antheriferous, ovary lobed, ovules 1-2 or many, fruit usually with a central prominent beak.

71 Averrhoa.

xx. RUTACEÆ.—Leaves opposite or alternate simple or compound, exstipulate gland dotted, ovary lobed usually surrounded by or inserted upon a fleshy disk, ovules 1-2 in each cell.

72 Evodia. 73 Zanthoxylon. 74 Acronychia. 75 Glycosmis. 76 Limonia. 77 Murraya. 78 Clausæna. 79 Atlantia. 80 Citrus. 81 Feronia. 82 Ægle.

xxi. SIMARUBEÆ.—Leaves alternate simple or compound eglandular, bitter to the taste, filaments usually pilose or with an adnate scale, ovary lobed, ovules 1-2 in each cell.

83 Ailanthus. 84 Samadera. 85 Balanites.

xxii. OCHNACEÆ.—Leaves alternate glabrous simple penniveined stipulate, stamens 10 or indefinite, anthers linear often elongate, ovary deeply lobed, fruit carpels distinct drupaceous.

86 Ochna. 87 Gomphia.

xxiii. BURSERACEÆ.—Usually abounding in resin, leaves alternate, exstipulate 3 foliate or pinnate, rarely 1 foliate, ovary entire, ovules 2 or 1 in each cell, albumen none.

88 Boswellia. 89 Garuga. 90 Balsamodendron. 91 Protium. 92 Bursera. 93 Canarium. 94 Filiceum.

xxiv. MELIACEÆ.—Leaves alternate exstipulate compound, stamens 8-10, ovary entire, ovules 2-4 to 10 in each cell.

95 Melia. 96 Mallea. 97 Dysoxylum. 98 Sandoricum. 99 ~~Milnea.~~ Aglaia 100 Lansium. 101 Amoora. 102 Walsura. 103 Heynea, 104 Beddomea. 105 Soymida. 106 Chickrassia. 107 Cedrela. 108 Chloroxylon.

xxv. CHAILLETIACEÆ.—Leaves alternate entire stipulate, petals bifid, ovary entire, ovules 2 in each cell.

109. Chailletia.

COHORT VIII. OLACALES.—*Ovary entire* 1 *many celled, stamens hypogynous or subhypogynous, ovules* 1-3 *in each cell pendulous, with a dorsal raphe, seeds usually albuminous.*

xxvi. OLACINEÆ.—Leaves alternate simple exstipulate, petals free or connate usually valvate, ovary 1 or imperfectly 3-5 celled, ovules usually solitary in each division of the ovary, albumen rarely wanting.

110 Ximenia. 111 Strombosia. 112 Anacolosa. 113 Lasianthera. 114 Gomphandra. 115 Apodytes. 116 Mappia.

xxvii. ILICINEÆ.—Leaves alternate simple exstipulate, petals imbricate, ovary 3-6 celled, albumen copious.

117. Ilex.

COHORT IX. CELASTRALES.—*Disk fleshy free or adnate to the calyx tube, stamens rarely more than the petals, inserted around or within the margin of the disk or hypogynous, ovules erect, flowers small usually hermathrodite.*

XXVIII. CELASTRACEÆ.—Leaves opposite or alternate simple, petals imbricate, stamens alternate with the petals or only 3.

118 Euonymus. 121 Lophopetalum. 124 Celastrus. 127 Elæodendron.
119 Glyptopetalum. 122 Kokoona. 125 Gymnosporia. 128 Hippocratea.
120 Microtropis. 123 Pleurostylia. 126 Kurrimia. 129 Salacia.

XXIX. RHAMNACEÆ.—Leaves simple, calyx lobes valvate, petals small concave, stamens opposite to the petals.

130 Zizyphus. 131 Scutia. 132 Sageretia. 133 Colubrina.

COHORT X. SAPINDALES.—*Disk various, stamens hypogynous or subhypogynous, ovary entire or lobed, ovules 1 or 2 in each cell ascending pendulous or laterally affixed rarely indefinite, flowers often unisexual or polygamous, leaves generally compound.*

XXX. SAPINDACEÆ.—Leaves alternate compound, style 1, ovules ascending or horizontal.

134 Hemigyrosa. 137 ~~Anomosanthes.~~ 140 Sapindus. 143 Pometia.
135 Schmidelia. 138 Schleichera. 141 Nephelium. 144 Harpullia.
136 ~~Cupania.~~ 139 Glenniea. 142 Euphoria. 145 Dodonæa.
146. Turpinia.

XXXI. ANACARDIACEÆ.—Usually abounding in resinous juice, leaves simple alternate or pinnate, often tufted at the ends of the branches. Styles 1-4 or stigmas subsessile, ovules solitary suspended or laterally affixed.

147 Mangifera. 150 Solenocarpus. 153 Drimycarpus. 156 Campnosperma.
148 Anacardium. 151 Odina. 154 Holigarna. 157 Spondias.
149 Buchanania. 152 Semecarpus. 155 Nothopegia. 158 ~~Rumphia.~~

XXXII. SABIACEÆ.—Stamens often unequal in size and some imperfect, equal in number to the petals and opposite to them, leaves simple or pinnate.

159. Meliosma.

COHORT XI. ROSALES.—*Flowers regular or irregular usually hermathrodite, stamens more or less distinctly perigynous, styles distinct.*

XXXIII. CONNARACEÆ.—Leaves 1-3 foliate or pinnate, flowers regular, stamens definite, carpels free 1-5, ovules 2 ascending orthotropous.

160 Connarus. 161 Ellipanthus.

XXXIV. LEGUMINOSÆ.—Leaves usually compound, flowers irregular or regular, stamens definite or indefinite free or connate carpel solitary, ovules 1-2 many anatropous or amphitropous attached to a ventral suture.

Papilionaceæ.

162 Indigofera. 166 Æschynomene. 170 Butea. 174 Calpurnia.
163 Tephrosia. 167 Ougeinia. 171 Dalbergia. 175 Sophora.
164 Mundulea. 168 Desmodium. 172 Pterocarpus. 176 Ormosia.
165 Sesbania. 169 Erythrina. 173 Pongamia. 177 Pericopsis.

Cæsalpinieæ.

178 Cæsalpinia. 181 Cassia. 184 Humboldtia. 187 Crudia.
179 Acrocarpus. 182 Dialium. 185 Tamarindus. 188 Hardwickia.
180 Poinciana. 183 Bauhinia. 186 Saraca. 189 Cynometra.

Mimoseæ.

190 Parkia. 193 Dichrostachys. 196 Acacia.
191 Adenanthera. 194 Mimosa. 197 Albizzia.
192 Prosopis. 195 Xylia. 198 Pithecolobium.

XXXV. ROSACEÆ.—Flowers regular, petals imbricate, stamens indefinite very perigynous.

199 Parinarium. 200 Pygeum. 201 Cotoneaster. 202 Photinia.

COHORT XII. MYRTALES.—*Flowers regular or subregular generally hermathrodite, ovary syncarpous, placentas axile, leaves simple entire rarely toothed.*

XXXVI. RHIZOPHOREÆ.—Sepals valvate, stamens various, ovary inferior or partly so, ovules few pendulous, albumen none or fleshy, leaves opposite or very rarely alternate, exstipulate.

203 Rhizophora 205 Kandelia. 207 Carallia. 209 Anisophyllea.
204 Ceriops 206 Bruguiera. 208 Blepharistemma.

XXXVII. COMBRETACEÆ.—Calyx lobes various, stamens often definite, ovary 1-celled, ovules pendulous, albumen none, leaves opposite or alternate exstipulate.

210 Terminalia. 211 Calycopteris. 212 Anogeissus. 213 Gyrocarpus.

XXXVIII. MYRTACEÆ.—Calyx lobes imbricate or open, petals imbricate, stamens indefinite, ovary inferior, albumen none, placentas subbasal, leaves dotted exstipulate opposite or rarely alternate.

214 Psidium. 216 Nelitris. 218 Barringtonia.
215 Rhodomyrtus. 217 Eugenia. 219 Careya.

XXXIX. MELASTOMACEÆ.—Calyx lobes generally imbricate or open, ovary within the calyx tube free or adnate, petals contorted, stamens definite curved down in bud, albumen none, leaves opposite exstipulate.

220. Memecylon.

xl. LYTHRARIEÆ.—Calyx lobes valvate, petals crumpled inserted on to the border of the calyx tube, ovary within the calyx tube but free 2-many celled, cells many ovuled, albumen none, leaves opposite or rarely alternate exstipulate.

221 Lawsonia. 223 Soneratia. 225 Axinandra.
222 Lagerstræmia. 224 Punica.

COHORT XIII. PASSIFLORALES.—*Flowers regular or rarely irregular, ovary syncarpous, placentas parietal, leaves entire lobed or cut.*

xli. SAMYDACEÆ.—Petals persistent with the sepals or none, stamens indefinite or anisomerous or opposite the petals, albumen copious, leaves alternate undivided, stipules minute.

226 Casearia. 227 Osmelia. 228 Homalium.

xlii. DATISCEÆ.—Flowers unisexual, segments of the calyx small 4, petals none, stamens 4 in male, ovary inferior, leaves alternate.

229. Tetrameles.

COHORT XIV. UMBELLALES.—*Flowers regular, ovary inferior 2 many rarely 1 celled, ovules solitary in the cells pendulous styles distinct or joined at the base on an epigynous disk, stamens definite, albumen copious.*

xliii. ARALIACEÆ.—Fruit succulent not separating, cells usually more than 2, leaves alternate often compound.

230 Pentapanax. 231 Polyscias. 232 Heptapleurum.

xliv. CORNACEÆ.—Fruit succulent 2 celled, leaves opposite or alternate and undivided, stamens alternate with the petals.

233 Alangium. 234 Mastixia.

SUB-CLASS 2.—MONOPETALÆ.

Petals united at least at the base into a single corol.

COHORT XV. CINCHONALES.—*Corol epigynous bearing the stamens.*

xlv. CAPRIFOLIACEÆ.—Leaves opposite without stipules, ovary 2 or more celled.

235 Viburnum. 236 Dichilanthe. 237 Lonicera.

xlvi. RUBIACEÆ.—Leaves opposite with stipules (stipules sometimes leaf-like in a whorl with the leaves), ovary 2 or more celled

238 Nauclea. 243 Grumilea. 248 Guettardia. 253 Stylocoryne.
239 Uncaria. 244 Serissa. 249 Coffea. 254 Griffithia.
240 Hymenodyction. 245 Hamiltonia. 250 Ixora. 255 Randia.
241 Morinda. 246 Canthium. 251 Pavetta. 256 Gardenia.
242 Mephitidea. 247 Timonius. 252 Discospermum. 257 Wendlandia.

xlvii. COMPOSITÆ.—Florets in compact heads, anthers united in a ring round the style, ovary 1 celled 1 ovuled.

255 Vernonia. 256 Monosis.

COHORT XVI. ERICALES.—*Stamens free from the corol.*

xlviii. ERICACEÆ.—Stamens usually twice as many as corol lobes, anthers opening by terminal pores.

260 Vaccinium. 261 Rhododendron.

COHORT XVII. SAPOTALES.—*Corol hypogynous or rarely perigynous bearing the stamens, which are either opposite the corol lobes or more than their number.*

xlix. MYRSINACEÆ.—Stamens opposite the corol lobes, placenta free and central, fruit a berry.

262 Ardisia. 263 Mæsa. 264 Myre.

l. SAPOTACEÆ.—Stamens opposite the corol lobes or twice as many, ovary 2 or more celled, ovules 1 or 2 in each.

265 Bassia. 267 Mimusops. 269 Sideroxylon.
266 Isonandra. 268 Sapota. 270 Chrysophyllum.

li. EBENACEÆ.—Flowers usually dicœcious, stamens indefinite, ovary 3 or more celled, ovules 1-2 in each cell.

271 Diospyros. 272 Maba.

lii. STYRACEÆ.—Stamens twice as many as the corol lobes, or more, ovary more or less inferior 2 or more celled, ovules 2 or more in each cell.

273 Symplocos.

COHORT XVIII. BORAGINALES.—*Corol regular hypogynous or rarely perigynous bearing the stamens, which alternate with its lobes and equal them in number (except in Jasminaceæ.)*

liii. JASMINACEÆ.—Stamens 2.

274 Ligustrum. 276 Olea. 278 Chionanthus.
275 Linociera. 277 Nyctanthes. 279 Schrebera.

liv. APOCYNACEÆ.—Carpels 2 usually distinct, stigmas united, filaments distinct.

280 Alstonia. 283 Cerbera. 286 Wrightea.
281 Carissa. 284 Plumieria. 287 Holarrhena.
282 Ophioxylon. 285 Tabernamontana. 288 Nerium.

lv. LOGANIACEÆ.—Stamens free, ovary 2 or more celled, placentas axile, leaves opposite sometimes stipulate.

289 Strychnos. 290 Buddleia. 291 Fagrœa.

lvi. BORAGINACEÆ.—Fruit 2 or 4 seeded, either 2 or 4 lobed or of 2 or 4 nuts, leaves alternate usually rough.

292 Cordia. 293 Ehretia.

lvii. SALVADORACEÆ.—Ovary superior 1 celled, ovule solitary erect, leaves opposite.

294 Salvadora.

Cohort XIX. Bignonales.—*Flowers irregular, stamens* 1 *less, or* 3 *less than the corol lobes, or* 5 *unequal and* 1 *or* 3 *sterile.*

lviii. Bignoniaceæ.—Fruit capsular 2 valved 2 celled, seeds winged, without albumen, cotyledons large leafy.

295 Bignonia.
296 Calosanthes.
297 Millingtonia.
298 Spathodea.
299 Stereospermum.
300 Pajanelia.
301. Heterophragma.

lix. Verbenaceæ.—Fruit composed of 2-4 nucules in a state of cohesion, with 1 seed in each, style terminal.

302 Tectona.
303 Premna.
304 Callicarpa.
305 Clerodendron.
306 Vitex.
307 Gmelina.

SUB CLASS III.—MONOCHLAMYDEÆ.

Perianth really or apparently simple or none (except in some Euphorbiaceæ).

lx. Laurineæ.—Anther cells opening by valves turned upwards. Perianth-segments usually six, berry or drupe 1 seeded, no albumen.

308 Cinnamomum.
309 Apollonias.
310 Phœbe.
311 Beilschmiedia.
312 Cryptocarya.
313 Tetranthera.
314 Litsœa.
315 Actinodaphne.
316 Alseodaphne.
317 Haasia,
318 Cylicodaphne.
319 Machilus.

lxi. Proteaceæ.—Perianth inferior, segments 4 valvate with a stamen on each, no albumen.

320 Helicia.

lxii. Santalaceæ.—Perianth wholly or partially superior, lobes valvate, stamens opposite the lobes, ovary 1 celled with 3-5 suspended ovules.

321 Santalum
322 Pyrularia.

lxiii. Euphorbiaceæ.—Flowers unisexual, ovary of 3 rarely 2 or more than 3 united carpels, with 1 or 2 pendulous ovules and usually separating into cocci, seeds albuminous.

323 Euphorbia.
324 Sapium.
325 Excœcaria.
326 Falconeria.
327 Cleidion.
328 Trewia.
329 Rottlera.
330 Macaranga.
331 Aleurites.
332 Gelonium.
333 Miscodon.
334 Croton.
335 Jatropha.
336 Dimorphocalyx.
337 Desmostemon.
338 Givoytia.
339 Sarcoclinium.
340 Agrostistachys.
341 Briedelia.
342 Amanoa.
343 Actephila.
344 Emblica.
345 Phyllanthus.
346 Melanthesa.
347 Cicca.
348 Prosorus.
349 Glochidion.
350 Bischoffia.
351 Pierardia.
352 Cyclostemon.
353 Hemicyclia.
354 Putranjiva.
355 Aporosa.
356 Antidesma.
357 Daphniphyllum.

lxiv. Thymeleæ.—Perianth lobes imbricate, stamens as many or twice as many inserted in the tube, ovary 1 or 2 celled with one pendulous ovule in each, style 1.

358 Lasiosiphon.
359 Hernandia.

lxv. Urticaceæ.—Flowers unisexual, males small, green not in catkins, stamens opposite to the perianth segments, ovary free, ovule 1 (or if 2, one always abortive), styles 2, or rarely 1 unilateral.

360 Bæhmeria.
361 Morocarpus.
362 Artocarpus.
363 Plecospermum.
364 Streblus.
365 Taxotrophis.
366 Antiaris.
367 Ficus.
368 Ulmus.
369 Celtis.
370 Sponia.
371 Gironniera.

lxvi. Myristicaceæ.—Perianth united into a valvate cup, leaves alternate entire, stamens monadelphous, ovary free 1 celled with 1 erect ovule, albumen copious ruminate.

372 Myristica.

lxvii. Salicaceæ.—Flowers diclinous in catkins, stamens 2 or more, ovary 1 celled, ovules many, seeds cottony, leaves alternate.

373 Salix.

lxviii. Casuarinaceæ.—Flowers diclinous in catkins, stamen 1, female flowers in dense heads, ovary 1 celled, ovule 1 obliquely ascending.

374 Casuarina.

SUB CLASS IV.—GYMNOSPERMÆ.

Ovules and seeds naked, without ovary or styles.

lxix. Cycadaceæ.—Leaves parallel veined pinnate, scales of the cone antheriferous.

375 Cycas.

lxx. Coniferæ.—Leaves simple acerose, females in cones.

376 Podocarpus.

CLASS II.—MONOCOTYLEDONS.

Stem not distinguishable into pith wood and bark, but when perennial, consisting of bundles of fibres irregularly imbedded in cellular tissue; with a firmly adherent rind outside, seeds with one cotyledon, the embryo undivided, the young stem being developed from a sheath-like cavity on one side.

Monocotyledons may generally be known by their simple entire alternate or radical leaves, with simple parallel veins, the base usually encircling or sheathing the stem or the base of the next leaf, and the parts of the flowers are usually in threes, the calyx and corol when present being generally similar in appearance and forming a perianth of 6 parts.

Palms, Screw pines and Bamboos are the only trees or woody plants in this class, which contains all Grasses, Orchids, Arums, Gingerworts, Irids, Lilies, Rushes, Sedges, &c.

* Flowers 6-merous in a panicle with a spathe.

lxxi. PALMÆ.

377 Calamus. 380 Areca. 383 Corypha.
378 Caryota. 381 Bentinckia. 384 Arenga.
379 Phœnix. 382 Cocos. 385 Borassus.

** *Perianth none or of small scales. Ovaries and stamens crowded in heads or spikes.*

lxxii. PANDANACEÆ.—Flowers in heads or branched spikes, anthers stalked, leaves prickly at the edge.

386 Pandanus.

*** *Perianth rudimentary or none, flowers sessile, with imbricated glumes.*

lxxiii. GRAMINEÆ.

387 Bambusa. 388 Dendrocalamus. 389 Bheesa.

ORDER 1.—DILLENIACEÆ.

Sepals 5 (rarely 3 4 or many), persistent imbricate in the bud, petals 5 or rarely fewer, imbricate deciduous, stamens indefinite hypogynous usually free, anthers innate dehiscing longitudinally or by pores, ovary of several carpels free and distinct or consolidated with the fleshy axis 1 celled with one or more ovules in each, styles distinct diverging, stigmas simple. Fruit carpels either indehiscent and succulent or capsular opening along the inner edge at the top. Seeds with a very minute embryo and fleshy albumen furnished with an arillus. Trees (shrubs, climbers or herbs). Leaves alternate, toothed or entire, stipules minute or none.

This Order includes 3 trees of Southern India, viz. Dillenia speciosa and pentagyna and Wormia bracteata, the first (with very handsome large white flowers) is rather common in a cultivated state, particularly about temples, but is rarely met with wild, the 2nd is met with in all our forests and is covered with bright yellow flowers in the hot season when destitute of leaves, the 3rd is a very handsome tree with large whitish flowers not uncommon in some of the mountain forests. There are several other species of Dillenia in Birmah and another in Ceylon, and a second species of Wormia grows in Ceylon; no other genera of this order are represented by trees or large shrubs in India, but the Indian genera Delima Tetracera Acrotrema, Schumacheria, furnish creeping or herbaceous plants. All the 3 South Indian trees will be figured in this work.

1. DILLENIA. LIN.

For Gen. Char. and description, &c. of the 2 species *speciosa* and *pentagyna*, see the Plates.

3. DILLENIA RETUSA. (Thunb.) A tree found in Ceylon up to 2000 feet, called Godapara.

2. WORMIA.

For Gen. Char. and description of the species bracteata, see the Plate.

2. W. TRIQUETRA. (Roxb.) A tree found in Ceylon up to 2000 feet, called Deryapara.

ORDER II.—MANGOLIACEÆ.

Sepals and petals usually numerous hypogynous, imbricate in the bud in several series of 3 or more each, and passing gradually one into the other. Stamens indefinite hypogynous, anthers adnate, carpels several either free or cohering laterally to each other, usually spicate on the torus, ovules 2 or more in each carpel, seed without any arillus, but the outermost coat usually fleshy, embryo minute at the base of a copious oily albumen which is not ruminate. Trees (shrubs or climbers). Leaves alternate undivided and usually entire. Stipules lateral adhering to the petioles but soon deciduous, or rarely none.

This Order includes two of our S. Indian trees, viz., Michelia champaca and M. Nilagirica, they are both very handsome trees, with large sweet scented flowers, the first is much planted about temples and occasionally seen wild, the second is wild in all woods on the higher ranges of the Nilgiris, Pulneys, &c. The genus Magnolia furnishes three trees in N. India, and two Himalayan trees belong to the genus Talauma, and there are three other species of Michelia recorded as Himalayan trees.

MICHELIA. LIN.

For Gen. Char. and description of the species *Nilagirica*, see Plate.

2. M. CHAMPACA. (L.) A large shady tree, branches glabrous, all the young parts pubescent or fusco-sericeous, leaves ovato-lanceolate acute at the base acuminate at the apex, glabrous above, beneath more or less puberulous, glabrescent when old, 8-10 inches long 2½-4 broad, petioles 1-1½ inch long stipules spathiform caducous, flowers axillary on short peduncles yellow, sweet scented, sepals and petals 15-20, 1½ to 2 inches long, exterior oblong cuneate rather acute, interior much narrower linear-oblong acute, ovules 4-12 in 2 vertical rows attached to the inner angle of the cell, carpels subsessile scabrous conjested on a spike which is 3-4 inches long, seeds from 1-12 of the size of a pea. *Roxb. Fl. Ind.* ii. 656;—*Wight Ill.* i. 13;—*Hook. et Thom. Fl. Ind.* i. *p.* 79. Michelia Rheedii, *Wight Ill.* 1. 14. *t.* 5. *f.* 6.

This is a large handsome shady tree, attaining a height of 70 feet with deliciously scented yellow flowers, it is found wild in the western forests of the Madras Presidency, in the Himalayas, Nepal and Birmah, but is much more common in a cultivated state particularly about temples, being held sacred by the Hindoos. It is known by the name of Champa all over India, but is sometimes called

Shemboo in Tamil ; the timber is close grained and heavy, very ornamental and beautifully mottled, it is used for cabinet purposes and furniture, the bark and all parts of the tree are very astringent, and used medicinally by the natives. There is an enormous show tree of this species on the Balarangums, about four miles from the Mysore Cinchona Gardens, it is upwards of fifty feet in circumference at the base but soon branches into 18 or 20 large stems, each of which are several feet in girth ; it is visited by a great many natives, and is self-established, as it is in a remote part of the forest on the banks of a stream.

ORDER III.—ANONACEÆ.

Sepals three distinct, or more or less connate, or combined into a regular cup, (in Cyathocalyx), petals six in two series or very rarely three, one series being suppressed, free or shortly connate at the base valvate or imbricate, stamens indefinite numerous, or rarely definite (in Orophea) free, usually closely imbricate upon a convex or rarely plane torus or laxly imbricate (in Miliuseæ), filaments short or 0 anthers adnate linear cuneate or quadrate, the connective usually produced or truncate and dilated above the cells, pistil of several or numerous free carpels, rarely of only one (Cyathocalyx) or the ovaries cohering or separately imbedded in the fleshy torus (Anona) stigmas capitate sessile, the styles ovate oblong linear or subulate, usually sulcate and stigmatose at the apex or along the inner face, ovules 1-2 or more basal or erect or attached to the ventral suture in one or two series, fruit carpels distinct, one or several seeded sessile or stipitate usually indehiscent or separately immersed in a pulpy or coriaccous fruit (Anona) seeds with copious ruminated albumen, with or without an arillus, embryo minute near the hilum. Trees or shrubs, (or climbing plants) leaves alternate simple entire exstipulate, flowers axillary terminal or variously extra-axillary solitary or fascicled rarely cymosely racemose or panicled, sessile or pedicellate, hermathrodite or rarely unisexual.

This Order is very abundantly represented in the moist western forests of this Presidency, but most of the species are only very small trees or large shrubs and of no importance to the Forester. The following are the only species in this Presidency that grow to be trees of any size

Miliusa velutina found in the dry forests of the eastern side of the Presidency. Polyalthia longifolia, abundant as a planted tree Polyalthia cerasoides in dry forests on both sides of the Presidency. Saccopetalum tomentosum in dry forests on the western side. Alphonsea 3 species on both sides of the Presidency in moist forests, or ravines on the banks of streams (Cuddapah and N. Arcot.) Mitrephora grandiflora, Polyalthia fragrans and coffeoides in moist forests only on the western side, all which except two of the Alphonseas will be figured in the plates of this work. and of the other less important genera dissections are here given ; these latter are as follows ; Sageræa two small trees yielding handsome wood, both rare in the dense moist forests at about 2,000 feet elevation. Cyathocalyx, one tolerably large tree in sholas on most of our western mountains. Unona, three unimportant shrubs or small trees. Polyalthia three shrubs. Popowia, one shrub or small tree. Goniothalamus, several small trees and shrubs. Mitrephora one small tree. Phœanthus one large shrub. Miliusa several large shrubs. Orophea one tree and several shrubs, all of which are only found in the moist forests on the western side of our Presidency, generally at about 2,000 to 3,000 feet elevation, never above 5,000 feet and seldom above 4,000 ; and Anona, three small fruit trees introduced, one of which has run wild all over the country.

Conspectus of the Tribes.

A. Carpels joined into a many celled fruit ... ... Anoneæ.
B. Carpels distinct.
  a. Petals imbricate ... ...Uvarieæ.
  b. Petals valvate.
    a. Stamens loosely imbricate, anthers conspicuous in the flower ... ...Miliuseæ.
    β. Stamens closely packed, connective generally only visible.
      i. Interior petals unguiculate ... ...Mitrephoreæ.
      ii. Interior petals not unguiculate.
        1. Interior petals thick triquetrous ... ...Xylopieæ.
        2. Interior petals nearly similar to the exterior ... .Unoneæ.

Conspectus of the Genera.

i. Uvarieæ.
  Stamens definite ... ...Sageræa.
ii. Mitrephoreæ.
  A. Ovule solitary or 2 from the ventral suture, inner-petals nearly as large as the outer.Popowia.
  B. Ovules 2 or solitary from the ventral suture, inner-petals very much smaller than the outer... ... ...Goniothalmus.
  C. Ovules indefinite ... ...Mitrephora.
iii. Anoneæ. ... ...Anona.
iv. Xylopieæ. ... ...Xylopia.
v. Unoneæ.
  A. Ovary solitary ... ...Cyathocalyx.
  B. Ovaries many.
    a. Petals nearly equal.
      1. Ovules 2-8 regularly placed on the ventral suture ... ...Unona.
      2. Ovule 1 erect from the base ... ...Polyalthia.
    β. Interior petals much smaller than the exterior ... ...Phœanthus.
vi. Miliuseæ.
  A. Exterior petals minute.
    a. Ovules in 2 series 6 or more ... ...Saccopetalum.
    β. Ovules in 1 series 1-2 ... ...Miliusa.
  B. Petals nearly equal.
    a. Ovules in 2 series ... ...Alphonsea.
    β. Ovules in 1 series ... ...Orophea.

SAGERÆA. Dalz.

Sepals 3 rotundate imbricate, petals 6 orbicular slightly fleshy concave imbricate in 2 series, stamens 12-28, carpels 3-6 ovules numerous in 2 series. Trees, leaves coriaceous shining very glabrous.

Sageræa Dalzellii. (Bedd. Icones Pl. Ind. p. 9. t. xlii.) Sepals cohering into a 3-lobed calyx, lobes rounded, stamens 28 all fertile, stigma entire.

A small handsome tree like a laurel with bright yellow flowers, in moist woods on the Anamallays at 2000 feet elevation.

2. Sageræa laurina Dalz.—Sepals imbricate, stamens 12 exterior ones sometimes sterile. *Dalz. H. f. et T. Fl. Ind.* i. 93,

An elegant middle sized laurel looking tree, with white flowers, found in the Concans and Canara, called Sajerce, yields a valuable reddish timber.

3. Sageræa Thwaitesii. (H. f. et T.) Sepals imbricated short obtuse, stamens about 18, stigma 2-lobed. *H. f. et T. Fl. Ind.* 1, *p.* 93 ;—*Bedd. Icones. Pl. p.* 9. *t.* xli.

A small tree in Ceylon at about 1000 feet elevation, flowers pale yellow.

A fourth species of this genus, 4 *S. elliptica,* is a large tree in Tenasserim.

POPOWIA. Endl.

Sepals 3 ovate valvate, petals 6 all nearly equal, thick ovate concave inflexed broadly unguiculate at the base, valvate, stamens 12-24 cuneate truncato-capitate, torus slightly elevated, ovaries 4-many, oval oblong, style large obovate recurved, ovules 1-2 erect or on the ventral suture, fruit globose or ovoid, trees or shrubs, flowers small axillary or leaf opposed.

1. Popowia ramosissima. (Wall. Cat. 7294). Branches rugulose young parts ferrugineo-tomentose, leaves ovate or oblong punctate beneath, flowers densely tomentose exterior petals larger than the inner ones ; interior ones thick ovate concave, stamens about 24, ovaries 4-7, ovule solitary on the ventral suture.—*Bedd. Icones Pl. Ind. p.* 15. *t.* lxxv.

A small tree or large shrub on the South Tinnevelly and Travancore mountains, 3-5,000 feet elevation, very common just below Aghasteer peak.

GONIOTHALAMUS. Blume.

Sepals 3 generally large valvate, petals 6 valvate in 2 series thickly coriaceous, exterior flat ovate or elongate, interior ones thick valvate broadly clawed and closely connivent into a mitreform cap, stamens numerous, ovaries numerous, ovules 2 or more rarely 1 on the ventral suture, carpels oblong 1 seeded, small trees or shrubs.

1. Goniothalamus Wightii. (H. f. et T.) A small tree, leaves glabrous narrow lanceolate 4-6 inch long by 1 inch broad, peduncles axillary solitary $\frac{1}{2}$ an inch long, flowers $\frac{3}{4}$-1 inch long, sepals persistent ovate acute, exterior petals ovate shortly and broadly unguiculate, interior $\frac{1}{2}$ an inch long, ovaries 14-18 sericeous, style elongate 2-clawed, ovules 1-2 from the ventral suture.—*H. f. et T. Fl. Ind. p.* 106 ;—*Bedd. Icones Pl. Ind. p.* 13. *Pl.* lxiii.

A small tree on the South Tinnevelly range, from 3,000 feet up to nearly 5,000 feet elevation.

2. Goniothalamus Thwaitesii. (H. f. et T.) A middling sized or small tree, leaves oblong $3\frac{1}{2}$-6 inch long by $1\frac{1}{2}$-$2\frac{1}{2}$ broad rigid coriaceous glabrous peduncles axillary $\frac{2}{3}$ to 1 inch long, flowers 1 inch long, exterior petals ovato-lanceolate glabrous thickly coriaceous with a short broad claw at the base, inner petals closely connivent into a mitreform cap, ovaries linear oblong strigose, style subulate longer than the ovary, ovules 2.—*H. f. et T. Fl. Ind. p.* 106 ;—*Bedd. Icones Pl.* 12. *t.* lviii.

A small or middling sized tree common in the moist forests on the South Tinnevelly and Travancore mountains at 3-4000 feet and also in Ceylon.

3. Goniothalamus Hookeri. (Thw.) A middling sized tree, leaves ovato oblong slightly narrowed at the base smooth, 6-13 inch long by $2\frac{1}{2}$-$4\frac{1}{4}$ broad, flowers pale green, sparingly rufo-hirsute, sepals persistent rotundate acute $\frac{3}{4}$ inch long, exterior petals 2 inch long, $\frac{3}{4}$ broad rotundate at the base slightly contracted above the middle, interior ones $\frac{3}{4}$ inch long, ovaries about 25, style long subulate, stigma small bipartite.—*Thw. En. Pl. Zey. p.* 6 ;—*Bedd. Icones Pl. p.* 14 *t.* lxvi.

A tree about 30 feet high in Ceylon at about 1000 feet elevation.

4. Goniothalamus Walkeri. (H. f. et T). A small erect tree, leaves aromatic linear oblong acute at the base shortly and obtusely acuminate at the apex 8-13 inch long by 2-3 inch broad, glabrous and shining above, flowers reddish, sepals persistent broadly ovate, acute nerved 2-4 lines long torus subglobose a little thickened, exterior petals ovate lanceolate 8 lines long, interior ones 5 lines long, style clavate stigma 2 lobed.

A small tree in Ceylon (Singhe rajah forest) called Kappooroo. The fragrant roots contain camphor and are chewed by the Cinghalese.

5. Goniothalamus cardiopetalus. (Dalz). Is a large shrub or very small tree abundant in the Wynad, Coorg and Canara ghats. 6. *G. Wynadensis* is a shrub in the Wynad, and 7. *G. Gardeneri,* 8. *Thomsoni,* 9. *salicinus,* and 10. *reticulatus* are all Ceylon shrubs ; they are all figured in the Icones Pl. Indiæ. 11. *G. Simonsii* is a small tree on the Khasya Hills, and 12. *G. sesquipedalis* a shrub found in Sylhet, Khasya and Tenasserim.

MITREPHORA.

For Gen. Char. see letter-press to plate of Mitrephora grandiflora.

1. M. grandiflora.—For description see plate.

2. M. Heyneana. (Thw.) A small tree, leaves glabrous coriaceous ovate to lanceolate $1\frac{1}{2}$-3 inches long by 1 inch broad peduncles leaf opposed short 1-3 flowered, sepals rotundate puberulous on the outside deciduous in fruit, exterior petals 2-3 inches long cuneato-lanceolate acuminate puberulous on both sides, interior ones villous trapezoid acute with a claw nearly $\frac{1}{2}$ an inch long, torus strigose, stamens numerous all fertile broadly cuniate, ovaries 6-9 densely strigose, 2-4 ovuled, carpel ovoid or subglobose $\frac{1}{2}$ inch long, hoary.—*Thw. En. Pl. Zeyl. p.* 8 ;—*Bedd. Icones Pl. p.* 16. *t.* lxxvii. Orophea, *H. f. et T. Fl. Ind. p.* 110.

A small tree common about the foot of the Tinnevelly hills in Travancore and in Ceylon.

3. MITREPHORA TOMENTOSA is a tree found in Assam.

ANONA.

Flowers hermathrodite, sepals 3 usually small and valvate, free or connate below, petals 6, or the 3 inner suppressed, exterior petals fleshy or thick and coriaceous, concave at least at the base spreading or connivent, valvate ; interior petals when present valvate or imbricate towards their apices, stamens indefinite, the connective more or less thickened beyond the anther cells, ovate or truncate, torus hemispherical or conical ; ovaries indefinite connate or immersed, styles and oblong stigmas free, ovules solitary erect fruit multilocular. Trees or shrubs.

There are 3 fruit trees belonging to this genus, but they are all of American origin, though A. squamosa, the custard apple, is quite wild all over the country, often in out of way parts of the hills, the sour sop with its prickly fruit is very common in gardens though not mentioned by Drs. Roxburgh or Wight. The three species may be briefly characterized as follows.—(as given by Prof. Oliver in his Flora of Tropical Africa.)

*—*petals* 3, *inner or very minute.*

Leaves narrow, oval-oblong, acuminate acute or scarcely obtuse, often a little rough and the nerves minutely pubescent or glabrescent below, flowers 2-4 together, fruit cordate or ovoid or ovoid-obtuse, faintly marked with nearly plane areolæ ... ... 1. A reticulata (the bullock's heart.)

Leaves slightly acuminate, obtuse or acute, glabrous or glabrescent more or less glaucous beneath, flowers solitary or in pairs, fruit ovoid-globose or rather conical, with prominent convex rhomboidal areolæ. ... 2. A squamosa (the custard apple.)

* *—*petals* 6, *inner conspicuous.*

Leaves obovate-oblong or oblong shortly acuminate, soon glabrous, inner petals broadly ovate-rotundate fruit ovoid or oblong-cordate, areolæ with short ascending aculei. ... ... 3. A. muricata (the sour sop.)

XYLOPIA. L.

Flowers hermathrodite, sepals 3 more or less connate, sepals 6 valvate in 2 series, exterior 3 linear, linear-subulate oblong or rarely-ovate thick usually scarcely expanding or connivent, 3 interior more or less shorter, similar in form and triquetrous above or ovate lanceolate and keeled and acute, torus plane or convex, plane or concave in the centre and in the latter case including the ovaries, stamens indefinite, the innermost sometimes coherent by their filaments into a sheath surrounding the ovaries or inserted upon a sheathing deciduous annular extension of the torus, usually narrow linear, anther cells frequently multilocellate, connective truncate dilated or more or less subpeltate, carpels few or numerous, styles elongate exserted forming a connivent cone ; ovules 2-10.—(Cælocline, *Alp. Dc.* ;—Patonia, *Wight* ;—Habzelia, *H. f. et T.*)

This genus has not been found on the Continent.

(1) X. parviflora, H. f. et T. and (2) X. Championi, H. f. et T. are small trees, and (3) X. nigricans, H. f. et T., a shrub indigenous in Ceylon.

CYATHOCALYX. CHAMP.

Flowers hermathrodite, sepals 3 joined into a 3-toothed or subentire cup, petals 6 valvate in 2 series concave at the base and constricted round the stamens, plane above, coriaceous, torus depresso-conical concave, stamens indefinite narrow cuneate, truncate at the apex, ovary 1 partly hid in the concave torus, oblong, stigma large peltate, ovules indefinite in 2 series on the ventral suture. A tree, leaves glabrous shining.

1. CYATHOCALYX ZEYLANICUS. (Champion). A middling sized tree, leaves oblongo-lanceolate with a sudden point, 6-10 inches long by 2-3 broad, shining and glabrous on both sides, peduncles 1-3 about $\frac{1}{2}$ an inch long, calyx cup hoary, petals 1-2 inches long more or less hoary, fruit broadly oval, a little larger than a goose's egg, seeds in 2 series numerous compressed 1 inch long transversely rugose, testa reddish brown.—*Champ. MS.* ;—*Hook. f. and T. Fl. Ind.* 1. *p.* 127 ;—*Bedd. Ic. Pl. p.* 10. *t.* xlvii.

This tree, which was formerly only known as a Ceylon and Malay plant, I have discovered throughout the moist forests of Malabar, South Canara and the Anamallays, at an elevation of 1-3,000 feet.

UNONA. LINN. F.

Flowers hermathrodite, sepals free valvate or very slightly imbricate at the base, petals 6 valvate in 2 series, plane spreading or the base more or less connivent round the genitalia nearly equal or the inner shorter or rarely wanting, stamens indefinite oblong-quadrate or cuneate, connective thickened and globose or truncate and dilated above the anther cells, torus plane or convex, ovaries indefinite free, stigma ovate obovate oblong linear or clavate sulcate on the inner face, ovules 2 many, 1 seriate or sub 2 seriate, carpels usually stipitate constricted between the seeds or continuous ovoid. Trees or shrubs.

1. UNONA PANNOSA. (Dalz.) A middling sized or small tree, leaves ovato-lanceolate obtusely acuminate $2\frac{1}{2}$-4 inches long, $\frac{3}{4}$ $1\frac{1}{2}$ broad, glabrous above, flowers of a dirty white color, axillary subsessile, sepals villous on the outside ovate acute 3 lines long, petals oblongo-lanceolate villous (like wooly cloth), 1-2 inch long, connective capitate subtruncate, ovaries 8-12 densely strigose, crowned with a short style, stigmas capitate, ovules 2-3, carpels 5-6 oval obtuse shortly pedicellate $\frac{3}{8}$ths of an inch long, seeds 1-3 large, testa shining smooth. *Dalz. in Hook. Kew Misc.* iii. 27. Uvaria mollis, *Wall. Cat.* 6475 ;—*Bedd. Icones Pl. p.* 11. *t.* lii.

A tree yielding a valuable strong fibre, common in most of our Western Ghat forests in moist woods up to 3,500 feet ; the wood is very tough.

2. UNONA DISCOLOR. (Vahl.) Is a very small tree or shrub found in Orissa, the Carnatic, Concan, Ceylon, Birmah and Sikkim. 3. U. *elegans* (Thw.) a small tree in Ceylon.

4. U. LAWII (H. f. et T.) a shrub in Malabar, and 5. U. *Zeylanica* (H. f. et T.) a shrub in Ceylon (all of which are figured in the Icones Pl. Indiæ), 6. U. *præcox* (H. f. et T.), and 7. U. *longiflora* (Roxb.) are shrubs found in Northern India.

POLYALTHIA. BL.

For Gen. Char. see letter press to the plate of P. cerasoides, Pl. 1.

1. POLYATHIA CERASOIDES (Dun.), 2. *longifolia* (Wall.), 3. *coffeoides* (Thw.), and 4. *fragrans* (Dalz.), will all be figured in this work as trees of size and importance.

5. P. ACUMINATA (Thw.) is a tree only found in Ceylon, and 6. P. *Moonii* is a shrub only recorded from that island. 7 P. *suberosa* (Dun.), 8. *corinta* (Dun.), and 9. *persicæfolia* (H. f. et T.), are shrubs inhabiting South India and Ceylon.

10. P. JENKINSII and 11. *Simiarum*, are trees found in North India.

PHŒANTHUS, H. F. ET T.

Flowers hermathrodite, sepals 3 triangular small, petals 6 ; 3 exterior much smaller than the interior, 3 interior thick coriaceous valvate, stamina linear, connective truncato-capitate, anthers linear oblong, ovaries linear oblong 8-12 or more, ovules solitary or twin on the ventral suture, style oblong.

Only one species of this genus is known on the Continent, Phœanthus Malabaricus (Bedd.) ; it is found in the moist forests on the ghats in Malabar, and is particularly abundant on the Tambercherry ghat. It is a large shrub.

SACCOPETALUM, BENNET.

For Gen. Char. see letter-press to plate of S. tomentosum, Pl. xxxix.

1. S. TOMENTOSUM ; for description see plate.

2. S. LONGIFLORUM (H. f. et T.) A large tree, leaves oval-oblong or oblongo-lanceolate, shining above, beneath adpresently puberulous, 8 inches long, by 3 broad (petioles $\frac{1}{3}$ inch) slightly coriaceous, flowers axillary from the axils of the fallen leaves, sepals oblong 2 lines long, interior petals oblongo-lanceolate obtuse $\frac{1}{3}$ inch long puberulous torus densely albo-villous, style elongate filiform subclavate at the apex, ovaries numerous, ovules about 10.—*(Wall. Cat.* 6443. *H. f. et T. Fl. Ind.* 1, *page* 151.)

A tree (nearly allied to the species figured) found in the Terai at the base of the Himalayas and in Upper Bengal.

MILIUSA. LESCH.

For Gen. Char. see letter-press to plate of M. velutina, Pl. xxxvii.

1. MILIUSA VELUTINA, for description see plate.

2. MILIUSA WIGHTIANA (H. f. et T.) A small tree, leaves narrow-oblong lanceolate to linear oblong with a longish obtuse acumination glabrous on both sides $1\frac{1}{2}$ to 4 inches long $\frac{3}{4}$ to 1 inch broad, petioles 1-2 lines long ; peduncles slender, 1-$1\frac{1}{2}$ inch long (and elongating in fruit) furnished with about 3 bracts at the base and 1 below the middle, sepals and exterior petals very small equal ciliate, interior petals about $\frac{1}{2}$ an inch long glabrous or subglabrous, stamens about 22 in 3 series, ovaries glabrous about 20, style oblong, nearly as long as the ovary, ovules 1-2 on the ventral suture, fruit bearing peduncles 2 inch long, pedicles $\frac{1}{4}$ to $\frac{1}{2}$ an inch, carpels glabrous globose 1 seeded, or oblong 2 seeded. *H. f. et T. Fl. Ind.* 1, *p.* 149 ;—*Bedd. Icones Pl. p.* 18. *t.* lxxxvi.

A small tree common in moist forests on the South Tinnevelly and Travancore mountains from 3,000 up to nearly 5,000 feet elevation.

3. MILIUSA ZEYLANICA (Gardn.) is a small tree in Ceylon, 4. *M. montana* (Gardn.) 5. *Indica* (Lesch), and 6. *Nilagirica* (Bedd.) are found in the western coast forests of the Madras Presidency, but do not grow to more than large shrubs ; these are all figured in the Icones Pl. Indiæ Or. 7. *M. Wallichiana* (H. f. et T.), 8. *Roxburghiana* (H. f. et T.), and 9. macrocarpa (H. f. et T.), are all three small trees natives of Northern India.

ALPHONSEÆ. A

For Gen. Char. see letter-press to plate of A. Madrasapatana.

1. ALPHONSEA MADRASAPATANA for description, see plate.

2. ALPHONSEA LUTEA. (H. f. et T.) A large tree, leaves oval oblong rounded or attenuated at the base, coriaceous, glabrous on both sides, and very shining above, 3-4 inches long $1\frac{1}{2}$-$2\frac{1}{2}$ broad, petioles 2-3 lines long, flowers congested small, fascicles leaf-opposed, sepals rounded deciduous, petals externally pilose scarcely $\frac{1}{2}$ an inch long, 3 exterior a little larger and pilose within on the upper portion, the interior glabrous on the inside, stamens indefinite in 3 rows, ovaries 5 strigoso-pilose, style very short, torus dilated in fruit globose, carpels 4-6 broadly oval $1\frac{1}{2}$ inches long fulvo-puberulous 3-6 seeded. *H. f. et T. Fl. Ind. p.* 153. Uvaria lutea, *Roxb. Fl. Ind.* ii. 66 (not W. A.);—*Bedd. Icones Pl.* 19 *t.* xci.

A handsome tree, banks of streams on the Orissa mountains and in Ceylon, Sylhet and Ava, and (if I do not mistake the species,) also on the ghats in South Canara.

3. ALPHONSEA ZEYLANICA. (H. f. et T.) A tree, leaves coriaceous, glabrous and shining above, lanceolate to elliptico-lanceolate, $2\frac{1}{2}$-4 inches long, $\frac{2}{3}$-$1\frac{1}{4}$ broad, petioles slender $\frac{1}{4}$ inch long, peduncles leaf opposed or supra-axillary, scarcely $\frac{1}{4}$ inch long, pedicels 1-3 about $\frac{1}{2}$ an inch long, petals $\frac{2}{3}$ inch long puberulous, stamens about 30 in 3 series, ovaries 5-6, style depressed, torus in fruit large glo-

Unona Lawii.

Popowia ramosissima.

Goniothalamus Wightii

Sageræa Dalzellii.

Cyathocalyx Zeylanicus.

Xylopia Championii.

Phœanthus Malabaricus.

Cephea erythrocarpa.

bose, carpels subglobose fulvo-tomentose, irregularly tuberculate 1¼ inch in diameter, seeds 4-6 in a single series. *H. f. et T. Fl. Ind.* 153. Uvaria lutea, *W. A. Prod.* 8. (Excl. Syn.) Guatteria acutifolia, *Wall. Cat.* 6,438 *D.;—Bedd. Icones Pl. p.* 19. *t.* xc.

A tree not uncommon on the Tinnevelly and Travancore mountains and in Ceylon (2-3,000 feet elevation.)

4. Alphonsea ventricosa (H. f. et T.) is a large tree in North India.

OROPHEA. Blume.

Sepals 3, petals 6 valvate, exterior 3 oval, interior 3 usually delicate in texture unguiculate, cohering above into a cap, stamens definite 6-12 loosely inserted on to the scarcely convex torus, some occasionally sterile, ovaries 3-15 oblong or obovate, ovules 2-4 in a single series on the ventral suture, stigma sessile capitate or oblong. Trees or shrubs, leaves small.

1. Orophea erythrocarpa. (Bedd.) A tree, bark olive green smooth, young parts aureo-pubescent leaves elliptic acuminate 2½-5 inches long, 1-2 broad glabrescent above, subpubescent beneath, petioles 1-2 lines long, peduncles axillary or above the axils bearing 3-5 pedicels, flowers ½ an inch in diameter, stamens 12 in 2 series, outer row sterile and very small, ovaries 6, 2 ovuled, carpels oblong acute 1 inch long, bright red, seed 1 scrobiculate. *Bedd. Lin. Trans. Vol. XXV* and *Icones Pl. Ind. Or. p.* 14. *t.* lxviii.

I have only found this elegant small tree in the moist forests of the Anamallays, at an elevation of about 2,000 feet; its wood is very tough.

2. Orphea Thomsoni. (Bedd.) A small tree or large shrub, glabrous, except the inflorescence and the costa of the leave beneath, leaves ovato-elliptic 2-4 inches long, 1½ broad, petioles 1-2 lines long, pedicels very short axillary 3 flowered, pedicels very short, sepals and petals strigose on the outside, stamens 10-12 biseriate, ovaries strigose 5-6 biovulate, carpels round size of a pea *Bedd. Lin. Tra. Vol. XXV.* and *Icones Pl. p.* 14 *t.* lxvii.

A small tree or large shrub common in moist forests on the western side of the Madras Presidency at 1—4,000 feet.

3. Orphea uniflora (H. f. et T.) Is a shrub common in our western forests up to nearly 4,000 feet. 4. *O. Zeylanica* (H. f. et T) is a shrub or very small tree found on the North Canara ghats and in Ceylon. 5. *O. coriacea.* (Thw.): and 6. *O. Obliqua* (H. f. et T.) are both small trees found in Ceylon. These are all figured in the Icones Pl. Ind. Or.

ANALYSIS OF GENERA.

Pl. I. Anonaceæ.

This plate gives the analysis of the following trees or shrubs, as no trees of these genera will be figured in the plates.

Unona Lawii
Popowia ramosissima.
Goniothalamus ~~al~~y. Wightii
Sagerea Dalzellii
Xylopia Championii
Cyathocalyx Zeylanicus.
Phœanthus Malabaricus.
Orophea erythrocarpa.

Order IV MENISPERMACEÆ. (By Prof. Oliver.)

Flowers small, diœcious. Sepals usually 6, sometimes 9-12, rarely 4 or 1, nearly always free, usually imbricate, in 2-4 series, the outer smaller, often very minute. Petals 6, shorter than or not exceeding the inner sepals, rarely 4 or fewer, free or united or 0. Male flowers : Stamens equal in number and opposite to the petals, rarely fewer or more, free or united ; anthers free, 2-4 celled, dehiscing longitudinally or transversely, or connate in a peltate disk. Female flowers : Staminodia 6 or 0. Carpels free, usually 3, in few genera 1 or 6-12, sessile or stipitate ; stigma terminal, entire or divided. Ovules solitary, usually amphitropous. Fruit-carpels drupaceous, with the scar of the style subterminal or by eccentric growth brought near to the base. Seed concave or sulcate on the inner face, often curved in the form of a horseshoe around an intruded portion of the putamen, with uniform or ruminate albumen or exalbuminous ; embryo with the cotyledons appressed or divaricate,—(climbing or twining shrubs or more rarely perennial herbs or) trees. Leaves alternate, exstipulate, usually palminerved, entire or lobed. Flowers small or minute, fascicled, cymose racemose or panicled, rarely solitary.

An order containing several genera of creepers but of no interest to the forester. The only tree or shrub being a species of *Cocculus*, a small tree common in sholas on the higher ranges of the Anamallays.

COCCULUS. *DC.*

Gen. Pl. i. 36.—*Gen. char* : Sepals 6, in 2 series, 3 inner larger. Petals 6, shorter than the inner sepals, entire or bidentate, concave or with involute margins embracing the stamens. Male flower : Stamens 6, free with 4-lobed anthers. Female flower : Staminodia 6 or 0. Carpels 3, with erect or recurved undivided styles. Drupes rotundate or obovate, compressed, with the scar of the style near the base. Putamen tuberculate or transversely rugose. Seed horseshoe-shaped, curved around opposite intruded processes of the putamen ; embryo with linear appressed cotyledons in a small quantity of fleshy albumen.

Cocculus laurifolius. *DC.*—A small tree or large shrub, leaves lanceolate coriaceous glabrous shining acute or acuminate mucronulate 3 nerved, 3-6 inches long, 1-1½ broad, petiole ⅓-½ inch long, panicles axillary or a little above the axils solitary or 2 superposed, 1-2 inches long, corymbose, the male generally the larger, bractes minute early deciduous, flowers minute, exterior sepals a half shorter than the interior acute, petals deeply 2 lobed, lobes obtuse or acute, sterile stamens 6 in the female flower, ovaries broadly oval, style cylindrical reflexed-drupe small rotundate. *H. f. et T. Fl. Ind.* 1. *p.* 191. Menispermum laurifolium, *Roxb. Fl. Ind.* iii. 815.

A small tree common in the moist woods on the higher ranges of the Anamallays 5-7,000 feet, and also found on the Himalayas and in Japan.

Analysis of Genera. Pl. II.

Male and female flower and fruit cut open of Cocculus cordifolius.

BERBERIDACEÆ.

Flowers hermaphrodite. Sepals petaloid, usually 3-6-9, and petals 6 or more, fewer or 0, free, hypogynous, early deciduous, all or the inner imbricate in æstivation. Stamens usually 6 or 4, free hypogynous, opposite to the petals ; anthers erect, 2-celled, usually dehiscing by valves. Pistil of a solitary, free carpel ; ovary 1-celled ; stigma usually with a peltate, discoid or dilated stigma, sessile or with a short style. Ovules few, basal or several on the ventral suture, anatropous. Fruit an indehiscent drupe. Trees, and shrubs. Leaves alternate fasciculate or radical, simple (unifoliolate) or compound. Flowers racemose paniculate cymose or solitary, usually yellow or white. An order represented in S. India by only two small trees.

BERBERIS. L.

Gen. char. : Sepals 6-9, petaloid. Petals 6, about the same size or little smaller than the sepals. Stamens 6 ; anthers dehiscing upwards in two valves ; stigma peltate. Ovules few, erect. Shrubs with the first leaves of the shoots often reduced to spines, bearing the fasciculate 1-foliolate leaves in their axils. Flowers yellow, racemose, fasciculate or solitary.

Berberis aristata. *DC. Sys. Veg.* xi. 8.—A shrub leaves simple coriaceous more or less persistent usually obovate or oblanceolate, spinuloso serrate or entire about 1 inch long, spines deeply divided into 3 sharp rigid segments, racemes pendulous or suberect longer than the leaves, pedicels slender petals distinctly biglandular, filaments without teeth, stigma of the ovary and fruit supported on a short style. Berberis tinctoria. *Lesch. W. A. Prod. p.* 16.

A large shrub or small tree common on the higher ranges of the mountains on the western side of the Madras Presidency, and in Ceylon and the Hymalayas, it is very closely allied to the common Barberry (B. vulgaris) which is found on the Himalayas and in Europe, and which differs principally in its sessile stigma ; the wood and the root contain a useful yellow coloring matter, and both the root and fruit are used medicinally.

2. Berberis Nepalensis. *Spr.*—A small tree bark very rough with deep fissures, leaves pinnate, leaflets 6-12 pairs, ovate nearly equal in size, slightly cordate at the base repand with 6-8 thorny teeth at each side about 5-nerved at the base, lower pair of leaflets close to the stem, racemes elongated slender, bracteoles at the base of the pedicel, oblong obtuse, petals with 2 distinct glands, filaments without teeth : berry globose crowned with the evident style and stigma. *Spr. Sys.* ii. 120 ;—*Hook. & Thom. Fl. Ind*, *p* 219. B. Leschenaultii, *Wall.* 1. *n.* 1479 ;—*W. A. Prod. p.* 16. Mahonia Nepalensis, *DC. Prod*, 1-109.

A small tree common on the Nilgiris and Western ghats in the Madras Presidency, from 5000 feet and upwards, inhabiting also the Himalayas and Khasya mountains, the Nilgiri species was considered distinct by Dr. Wallich, and named after M. Leschenault but it is not separable from the N. Indian tree.

The wood is of a most brilliant yellow color; and might be used for inlaying purposes; it is however rather soft and porous. The tree is called Jakkahi on the Nilgiris, is very ornamental, and often planted in gardens; though always a small tree in S. India it is seldom more than a shrub in the North.

Analysis of Genera. Pl. II.

Dissections of the flower and fruit of Berberis Nepalensis.

Order VI CAPPARIDACEÆ.

Flowers regular or the sepals or petals sometimes unequal, rarely polygamous. Sepals 4, rarely 3 or 5, free or connate below valvate, imbricate or open in æstivation. Petals 4 or 0, rarely 3 or indefinite, sessile or clawed. Torus sometimes with a linear, oblong or ligulate-tubular appendix. Stamens definite or indefinite, inserted upon the torus, which is sometimes shortly columnar, or the filaments adherent more or less to the gynophore; filaments equal or unequal usually filiform; anthers usually oblong or linear, 2-celled, dehiscing longitudinally (some of them effete in certain species). Ovary sessile or supported upon a gynophore of various length, usually ovoid, globose or oblong, 1-celled or divided by spurious dissepiments into 2 or more cells. Ovules indefinite, sometimes few, parietal. Fruit a siliquiform capsule, or baccate, oblong, globose or elongate, cylindrical or torulose, many-or few, rarely 1 seeded. Seeds usually more or less reniform, or somewhat angular in baccate fruits with a crustaceous or coriaceous testa; albumen thin or 0. Embryo usually curved; cotyledons plane, folded or convolute; radicle often conical and incumbent. (Herbs) shrubs or trees, often scandent, glabrous pubescent tomentose glandular or scabrid. Leaves alternate rarely fasciculate, simple or 3-7-foliolate, leaflets usually entire; stipules, when present, minute or represented by short spines. Flowers axillary or terminal, solitary racemose corymbose fascicled or umbellate, often showy.

An order of no importance to the forester, being only represented in S. India by 4 small trees, viz. 2 belonging to the genus Capparis, and 2 to Cratæva, and a few shrubs; the genera Gynandropsis, Cleome, Polanisia. Niebuhria and Cadaba yield herbaceous plants or very small shrubs. Cratæva religiosa will be figured in the plates, and analysis of 1 species of Capparis is here given :—

Leaves simple, branches often spinose..... ....Capparis.

Leaves trifoliate, unarmed..... ....Cratæva.

CAPPARIS. L.

Gen. Pl. i. 108.—Sepals 4 (very rarely 5), free or connate at the base (or united and splitting irregularly in some species), equal or the two outer broader and more concave or the two inner petaloid, imbricate or valvate, or in two series, the outer pair valvate in æstivation. Petals 4. Stamens indefinite (8-∞), inserted upon the torus Filaments free. Ovary upon a gynophore usually from $\frac{1}{4}$ to 2 inches in length, 1-celled or sometimes few-celled, with 2 or more parietal placentas; ovules usually indefinite; stigma sessile. Fruit stipitate with one or many seeds, indehiscent or sometimes separating into 3 or 4 valves. Trees or shrubs (often climbing or sometimes prostrate), unarmed or with short, often recurved, stipular spines. Leaves simple, coriaceous or submembranous, rarely wanting. Flowers usually hermaphrodite, solitary, racemose, corymbose, or umbellate, axillary or terminal.

Capparis aphylla, *Roth. Nov. Pl. Sp.* 238—A much branched, glabrous tree or shrub. Branches terete, leafless, excepting in young plants and on barren shoots, usually with short, nearly straight or ascending stipular spines. Leaves, when present, linear or linear-lanceolate. Flowers red, about 1 inch in diameter, in lateral and terminal fascicles or corymbose racemes. Pedicels $\frac{1}{2}$ inch or shorter. Sepals unequal in breadth; the anterior outer sepal larger and deeply saccate, but slightly imbricate or subvalvate (at least the 2 outer) in æstivation. Ovary on a gynophore of $\frac{1}{2}$-$\frac{3}{4}$ inch. Style about half as long as the ovary. Fruit ovoid red size of a cherry, pointed or subglobose, several or many-seeded. *C. Sodada*, Brown in Denham and Clapp. App. 20. *Sodada decidua*, Forsk. *Fl. Ægypt.* 81; Delile *Fl. Ægypt. t.* 26.

A small tree found in the Coimbatore, Madura and Tinnevelly districts, also in the Punjab, Guzerat and the Dekhan, delighting in an arid climate; its general girth is only about 2 feet, but one of 8 feet in girth has been mentioned by Mr. Edgeworth. It is commonly used for fuel, burning with a strong flame even when green; its wood is also stated to be durable, and from its bitter qualities, not liable to the attacks of white-ants; it is used for rafters, ploughshares and for knees in boat building. The fruit is eaten by the natives.

Capparis stylosa, *DC. Prod.* 1. 246.—A small tree or large shrub, stipules thorny short straight, leaves from exactly linear to elliptical mucronate glabrous 5 nerved at the base otherwise feather-nerved, nerves parallel nearly simple converging towards the point of the leaf, pedicels short stout axillary solitary 2 or 3 times longer than the petiole, 1 flowered, flowers rather large green, ovary smooth oblong furrowed, fruit size of a billiard ball, scarlet, warted, with 6 ridges.—*W. A. Prod. page* 25. Capparis divaricata, *W. A. Prod. p.* 27, *and Wight. Ic.* 889.

Very common both as a shrub and small tree all over the Coimbatore district, Madura, Salem, &c., and in the Dekhan; as a shrub it has a very narrow linear leaf only 1 line in breadth, and apparently never flowers in that state; as a tree the leaves are much broader; its wood is used as fuel.

Analysis is given of the flower of this species.

Capparis grandis. *Linn.*—A small tree, trunk thick tolerably straight but of no great height; branches numerous spreading. Thorns small stipulary recurved or often wanting, leaves attenuated short petioled oval to ovate acute or obtuse or emarginate; when young covered with a greyish tomentum at length glabrous about 2 inches long and 1$\frac{1}{2}$ broad; racemes terminal many flowered corymbiform, calyx of 4 unequal sepals, petals 4 oblong waved unequal very globose 2 seeded a little larger than a cherry.—*DC. Prod.* 1. *p.* 248. C. maxima, *Heyne DC.* 1. 248. Capparis bisperma, *Roxb. Fl. Ind.* ii. 568;—*Wight. Ic. t.* 21.

This tree is very common on the Eastern ghats of the Madras Presidency, and on the Kurnool mountains, and is found sparingly in other parts all over the Presidency, and in Bombay, in the Godavery forests it is called Regguti in Telugu, but I never heard Roxburgh's name of Guli given to it. The wood is hard, heavy, and durable, and is much used by the natives.

There are a good many other species of Capparis, but they are only straggling shrubs or climbers, or thorny hedge plants, and need not be recorded in this work.

CRATÆVA. Linn.

For Gen. Char. and description of C. religiosa, *Forst*, see letter press to the plates of that species.

2.—Cratæva Nurvala. *Ham.*—A small tree or shrub, leaves trifoliate, leaflets ovate-lanceolate acuminate, lateral ones unequal at the base, limb of the petals ovate roundish, stamens numerous, torus hemispherical, berry ovoid.—*Ham. in Linn. Soc. Trans.* 15, *p* 121 ;—*Rheed. Mal.* 3. *t* 42.

A small tree or shrub common in Malabar, Mysore and Bombay ; it scarcely differs from C. religiosa (Roxburghii of *R. Br.*) except in the leaflets being ovate-lanceolate instead of obovate, and in the shape of the fruit. The leaves, bark, root and seeds are used medicinally by the natives ; it is called Nirvalá in Malabar.

Analysis of Genera. Pl. II.

Dissections of the flower and ovary of Capparis stylosa.

Order VII MORINGACEÆ. (By Prof. Oliver).

Flowers irregular, hermaphrodite, calyx 5-partite, with a short, cup-shaped tube and unequal imbricate, at length spreadin, or reflexed segments, Petals 5, similar in form to the calyx lobes, 2 upper smaller. Stamens 5, alternating with 5 staminodes or 10 declinate ; liaments free, inserted in the margin of the disk ; anthers 1-celled, dorsifixed. Ovary 1-celled stipitate ; style terminal, slender ; ovules indefinite, anatropous, pendulous on 3 parietal placentas. Capsule siliquiform, 3-6 angled, 3-valved, many seeded. Seeds rather large, with or without wings, exalbuminous ; radicle superior. Trees with 2-3 pinnate leaves, clustered at the ends of the branches ; leaflets obovate or obovate-oblong, often caducous, or the leaves reduced to the jointed rachis. Panicles ample, hoary or glabrous, of rather large whitish pale yellow or red flowers. Capsules 6-20 inches in length.

A small and anomalous family of doubtful affinity, based upon the single genus. Confined to India, E. tropical Asia, and warm regions between.

MORINGA.

Juss. Benth. et Hook. f. Gen. Pl. 1. 430. Char. of the genus that of the order.

M. pterygosperma. *Gærtn.* For description, vide letter press to the plate.

BIXINEÆ. (By Prof. Oliver.)

Flowers regular, hermaphrodite or 1-sexual. Sepals 3-8, free or united below, imbricate or rarely subvalvate in æstivation, Petals as many as the sepals or numerous or wanting, imbricate or contorted. Stamens hypogynous, indefinite ; anthers 2-locular. dehiscing longitudinally or by terminal slits. Torus with or without a thickened disk. Ovary free, 1-celled or with the walls intruded so as to be spuriously multilocular ; placentas usually 2-many, with many or few, more or less anatropous ovules. Fruit capsular or baccate, separating into as many valves as placentas or indehiscent. Seeds few or many, usually with fleshy albumen, and an axile, embryo with broad cotyledons. Trees or shrubs, sometimes armed with axillary spines. Leaves alternate, simple. Stipules minute or 0. Flowers axillary or terminal or from the old wood, solitary, fascicled, racemose or panicled, in some of the petaloid genera large and showy ; in the dicœcious genera insignificant.

An order represented by 8 Indian genera of trees but with the exception of *Hydnocarpus* not of much importance to the Forester. Cochlospermum has only one Indian species, a tree with a soft worthless timber, but with handsome large yellow flowers of great beauty. *Bixa*, 1 species an introduced tree common in gardens. *Scolopia* several trees with generaly very spiny *trunks*. *Flacourtia* 5 species usually spiny. Hydnocarpus 4 species, 1 of which is confined to Ceylon. *Erythrospermum Aberia* and *Trichadenia* a single species each, and all confined to Ceylon. Little or nothing is known of the timber of the different species of *Scolopia* and *Flacourtia* or of the 3 last mentioned genera. *Bixa Orellana Scolopia* crenata and Hydnocarpus alpinus will be figured in the plates ; and dissections are here given of *Flacourtia Erythrospermum Aberia* and *Trichadenia*.

COCHLOSPERMUM. *Kunth.*

Benth & Hook. Gen. Pl. 1. 124. Flowers hermaphrodite. Calyx of 5 unequal, imbricate sepals. Petals 5, large, contorted-imbricate in œstivation. Stamens indefinite, free, with oblong or linear anthers, opening by a short porelike slit at the apex, on the inner face. Ovary 1-celled, with 3-5 projecting, multi-ovulate placentas. Style undivided, slender. Stigma simple, obtuse or minutely toothed. Capsule somewhat papery, separating into 3-5-valves when ripe, each valve alternating with a corresponding valve of the submembranous endocarp. Seeds numerous, reniform or spirally twisted, covered or fringed with long cottony hairs ; testa horny ; embryo curved. Shrubs or trees, affording a yellow dye. Leaves alternate, palmately-lobed. Flowers, showy yellow, pedicellate, fascicled, racemose or panicled, either terminal or from the upper axils or from the old wood of the stock or from the old wood of the stock.

Cochlospemum gossypium. *DC.*—A tree unarmed, trunk erect, bark smooth ash-coloured, leaves scattered about the ends of the branchlets 3-5 lobed, 2 to 8 inches long above pretty smooth, below covered with whitish down, the lobes entire acute, petioles as long as the leaves, stipules linear acute caducous, flowers terminal numerous panicled very large bright yellow, bracts stipule like caducous, calyx 5 leaved leaflets oblong concave, petals 5 obliquely obovate, obliquely and deeply emarginate or rather cleft, spreading, filaments numerous short distinct anthers linear nearly as long as the filaments, style rather longer than the filaments but bent to one

side, stigma simple, capsule broad, turbinate sub-globular as long as a goose's egg, 5 lobed, seeds numerous kidney-shaped wooly.—*DC. Prod.* 527. Bombax gossypium. *Roxb. Fl. Ind.* iii. *p* 169.

A tree very common on the mountains on the Eastern side of the Presidency and about the dry slopes of the Nilgiris, Salem, Madura, Travancore, Mysore &c. and in Bengal ; its very handsome flowers appear in February or March when the tree is destitute of leaves ; the timber is soft and valueless, and the cotton is of no value except for stuffing pillows &c. The gum which exudes from the trunk is officinal. The tree is occasionally met with in gardens and is well worth cultivating for the beauty of its flowers and foliage.

BIXA, Linn.

For Gen. Char and description of the species B. orellana see letter press to plate.

SCOLOPIA. Schreb.

For Gen. char and description of *S. crenata* see letter press to the plate of that tree.

2—S. Chinensis *Clos.* A middling sized tree, trunk armed with large compound spines, branches generally unarmed, leaves oval obscurely serrated towards the apex 1½-2¼ inches long, 1-1½ broad, obscurely and very shortly acuminate at the apex, rounded or retuse, petioles ¼ inch long, berry size of a pea subglobose pulpy reddish black,—*Clos. in Ann. des. Sc. Nat. Ser* 4, *VIII. p.* 249.—Phoberos chinensis, *Lour.* Phoberos Arnottianus, *Thw. En. Pl. Zey. p.* 16. *and p.* 400.

Introduced to South India and Ceylon from China.

3.—S. Gœrtneri. *Thw.* A middling sized tree, trunk armed, leaves reticulated on both sides with prominent veins very variable in shape lanceolate to oblong, ovate or rotundate, cordate 1-2 inches long, by ½-¾ in broad, sepals 10 rounded obtuse, berry subglobose size of a pea pulpy reddish black.—*Thw En. Pl. Zey. p* 17, *and* 400. Scolopia pusilla *Clos.* l. c.

Ceylon sea coast up to 1,500 feet called Katu Kurundo ; the variety with lanceolate leaves may, Dr. Thwaites thinks, possibly be a distinct species. Wood hard, strong and elastic.

4.—S. acuminata, *Clos.* l. *c.* A middling sized tree spiny when young, at length unarmed, leaves glabrous ovato-lanceolate with a long acumination, serrated towards the apex below the acumination narrowed at the base 2-3½ in. long, 1-1¾ broad pale beneath, obscurely and finely venose, petioles 2-3 lines long sepals 10-12 broadly lanceolate, berry subglobose size of a cherry green firm and fleshy—*Clos.* 1. *c.* Phoberos acuminatus, *Gard. Thw. En. Pl. Zey. p.* 17 *and* 400.

Ceylon from 1,000 to 3,000 feet elevation.

5.—S crassipes. *Clos.* A very large tree, when young spiny, at length unarmed, leaves ovate sub-acuminate, narrowed at the base, margin slightly undulate 1¼-2 inches long ¾-1 inch broad, very coriaceous reticulated beneath with prominent veinlets, petioles scarcely 2 lines long, sepals 12-14 oblong, berry size of a cherry or larger green fleshy and firm.—*Clos.* 1. *c.* Phoberos Hookerianus, *Wight MSS, Thw. En. Zey. p.* 17 *and* 400.

Ceylon 4,000 to 7,000 feet elevation.

6.—Scolopia Wightiana. A good sized tree, exceedingly thorny, leaves roundish ovate with a short obtuse acumination without glands at the base, scarcely serrate, the serratures often resembling mere glands, very coriaceous and hard, beneath somewhat prominently reticulated. Flacourtia Wightianus.—*W. A. Prod p.* 30.

Nilgiris.

ERYTHROSPERMUM, Lam.

Benth. and Hook. Gen Pl. 1. 127. Flowers hermathrodite, sepals 4-6 much imbricate, petals 5-6, stamens 5 inserted on to the torus which has no glands, anthers lanceolate-sagittate scarcely shorter than the filaments, connective dilated, ovary stipitate, placentas 3-4, many ovuled style short, stigma entire or 3-4 cleft, capsule 3-4 valved 1-few seeded, testa coriaceous, embryo slightly incurved. Trees or shrubs, leaves entire.

E. phytolaccoides, *Gard.*—A middling sized tree 20-30 feet, branches glabrous terete, leaves alternate rather distant oblongo lanceolate acuminate acute at the base, very glabrous on both sides shining above paler beneath entire or obscurely serrate reticulated with prominent veins, 3½-8 inches long, 1½-3 inches broad, petioles 3-8 inches long, sulcate above, swollen at the base and apex, stipules minute lanceolate, racemes many flowered paniculate terminal or axillary, about equalling the leaves, peduncles glabrous; pedicels 2-3 lines long, 3 bracteolate at the base, sepals 5 white tinged with red ovate obtuse concave about 2 lines long, petals white ovato-oblong obtuse ciliate when very young, equalling the sepals, anthers saggitate, ovary oblong glabrous stipitate capsule globose 3-5 lines in diameter, 3-4 valved nearly to the base, 1, few seeded.—*Gar. in Calc. Journ. of Nat. His. vol.* vii. *p.* 11 ;—*Thw. En. Pl. Zey. p.* 18.

Ceylon up to an elevation of 1500 ft.

FLACOURTIA. *Commers.*

Benth. and Hook. Gen. Pl .1 p. 121.—Flowers diœcious or rarely bisexual, calyx 4-7 parted lobes sometimes unequal imbricate petals 0 Male flowers : stamens very numerous with small roundish or subdidymous 2-celled unappendaged anthers attached at the back and dehiscing longitudinally, ovary 0. Female flowers : stamens 0, ovary surrounded by an annular or interrupted disk, usually 4-8 celled with a pair of superposed ovules (the upper ascending the lower pendulous) in each cell, the upper and lower ovules separated at length by spurious dissepiments. Styles 4-8 more or less radiating persistent, stigmatic apices retuse or emarginate ; bisexual flowers having the characters of both the male and female ; fruit a berry 5-16 celled, seeds bony. Trees or shrubs frequently spinose with alternate simple leaves, flowers small in terminal or axillary racemes or fascicles or small panicles, or the female often solitary ; fruit often edible.

FLACOURTIA RAMONTCHI. *L'Herit. Strip. Nov* 59, *t.* 30. 30 *β.*—A small glabrous tree or shrub or with the young parts and petioles obsoletely puberulous, frequently armed with acute, axillary ascending or spreading spines, 1-2 inches in length. Leaves shortly petiolate, glabrous at length shining, and when dry veiny above broadly elliptical or varying from obovate to oblong-elliptical; apex usually rounded and obtuse, sometimes broadly pointed; base rounded or more or less cuneate, broadly (sometimes obscurely) crenate or crenates-errulate, 2-3½ inches long, 1¼-2¼ inches broad, petiole 3-5 lines. Flowers 1-2 lines in diameter, in short few-flowered terminal racemes or terminating short lateral shoots. Fertile flowers perhaps usually solitary. Styles 5-7, very short, radiate, each longitudinally grooved above. Fruit a roundish, pulpy, edible berry, ½-1 in. diameter with about 10 seeds.—*Roxb. Fl. Ind.* iii. *p.* 834 F. sapida. *Roxb. l. c. p* 835.

A native of various parts of the Presidency and in Bengal and Bombay, called Pedda Kàuru and Kànregu in Telegoo, and Kànju in Hindostanee. The timber is straight and close grained, but too small to be of much use; it is sometimes used for ploughs and in turnery, and for carts; the fruit is eaten.

2.—F. INERMIS. *Roxb.* A middling sized tree, unarmed trunk short soon dividing into numerous branches forming a dense head, bark smooth brownish and without any thorns, leaves alternate short petioled elliptic smooth of a shining green on both sides and reddish when young, racemes axillary short, flowers hermathrodite, calyx 4-5 parted, stamens about 20 inserted on to the annular disk which surrounds the base of ovary, ovary 5-celled with 2 ovules in each attached to the middle of the axis, style 5-6 radiating, berry size and appearance of a red cherry and very smooth, seeds as far as 10.—*Roxb. Fl. Ind.* iii. 833.

Found in many parts of the Madras Presidency, but perhaps introduced; the tree is very ornamental, the fruit is eaten and makes good tarts; the tree flowers in the hot weather, and ripens its fruit in September. I know nothing of its timber; it is called Ubbolu in Canarese.

3.—F. CATAPHRACTA, *Willd.* A middling sized tree, trunk short armed with numerous large decompound thorns, bark pretty smooth, branches mumerous, generally unarmed except close to the trunk, leaves alternate short petioled ovate oblong serrulate smooth shining green on both sides 2-3 inches long, racemes axillary small 5-10 flowered, a small cordate bract below each pedicel, male calyx 4-5 parted stamens inserted into a glandular convex receptacle, female calyx of 4-6 spreading sepals with an annular lobed disk surrounding the ovary, styles 4-6 radiating, berry size of a common plum globular smooth purple succulent 8-12 seeded, seed hard sharp edged.—*Roxb. Fl. Ind.* iii. *p.* 834.

Malabar, South Canara and Bombay; the fruit is edible.

4.—F. SEPIARIA, *Roxb.* A shrub with large simple thorns which are often leaf and flower bearing, leaves obovate or round serrate smooth, peduncles axillary and terminal; berries size of a pea about 5-seeded.—*Roxb. Fl. Ind.* iii, *p.* 835;—*Rheed Mall*, v. *t.* 39.

A common shrub throughout the Madras Presidency, Bengal and Bombay, called in Telugu Kanru; it is of no use except for firewood.

5.—F. MONTANA, *Graham.* A middling sized tree with an armed trunk, young shoots with axillary thorns, leaves ovate oblong crenate, fruit scarlet of the size of a large cherry.—*Dalz. Bombay Flora. p.* 10.

Common on the Bombay ghats; native name Attak; the fruit is agreeable and slightly acid.

ABERIA. HOCHST.

Flowers dicœcious, sepals 5-8 imbricate, petals 0. Male flower: stamens indefinite, anthers shortly oblong introrse dehiscing longitudinally, rudiment of an ovary none or very small, no hypogynous disk. Female flowers: calyx as in the male persistent, stamens 0, ovary seated on an hypogynous crenulated disk, placentas 5-7 (2 ovulate) very prominent and nearly meeting in the centre, and so forming a 5-7 celled ovary, styles as many as the placentas, berry 1-6 celled, seeds 1-6 attached to the walls of the cavitiess Small trees with or without spines, leaves alternate simple, fruit edible.

ABERIA GARDNERI. *Clos.* A middling sized tree 16-20 feet, unarmed, branches terete tuberculate, young ones tomentose, leave ovate oblong or oblong lanceolate acuminate subobtuse at the base, entire or dentate serrate, above pubescent, beneath tomentose, about 4 inches long by 2 broad, petioles about 4 lines long, costa and primary veins reddish, male peduncle short often twin, pedicels 10-20 umbellate about 4 lines long pubescent, calyx lobes lanceolate acute pubescent, filaments filiform equalling the segments of the calyx, female pedicels 1-3, calyx lobes as in the male, ovary densely pubescent subglobose, styles diverging 1½ lines long pilose, berry about 1 inch in diameter.—*Clos. in Ann. des Sc. Nat. ser.* 4. viii. *p.* 236. Roumea hebecarpa, *Gard. in. Calc. Journ. of Nat. His. vol.* vii. *p.* 9.;—*Thw. En. Pl. Zey, p.* 18 *and p.* 400.

Ceylon, called Katambilla; the acid fruit is eaten.

TRICHADENIA. THW.

Flowers dicœcious, calyx gamosepalous entire calyptriform at length irregularly cleft, petals 5, hypogynous imbricate, squamules 5 lanceolate opposite to the petals fleshy hirsute. Flowers male, stamens 5 alternate with the petals, spirally contorted in æstivation, filaments thick slightly pilose at the base, anthers oblong dehiscing longitudinally, rudiment of ovary none. Flowers female, staminodia none, ovary sessile free 1 celled, placentæ 3, 1 ovuled, ovules suborthotropal horizontal; styles 3 diverging, stigmas broad reniform crenate, berry spherical 1-3 seeded, testa long, embryo orthotropal in the axis of the fleshy albumen, radical short cylindrical, cotyledons foliaceous plicato rugose. A tree, leaves penninerved, stipules foliaceous caducous, panicles axillary.—*Thw. in Hook. Kew. Journ.* vii. 196.

TRICHADENIA ZEYLANICA, *Thw.* A large tree, young branches tomentose, leaves alternate petioled, oblong penninerved coarsely dentate or sinuate towards the apex, narrowly acuminated at the apex, rounded at the base, 5-12 inches long by 2-4 broad, petioles 2-3 inches long, stipules foliaceous concave caducous, panicles racemiform axillary shorter than the leaves, flowers 6 lines broad, pale green, fruit globose 9-11 inches in diameter.—*Thw. Hook. Kew. Journ.* vii. 196, *t.* 5.;—*En.* Pl. *Zey. p.* 19.

Ceylon, at an elevation of about 3000 feet, not uncommon, called Tatti. The oil extracted from the seed is used for diseases of the skin.

HYDNOCARPUS, GŒRTN.

For Gen. char. and description of H. alpinus, see letter press and the plate of that species.

2.—H. WIGHTIANA, Bl. A middling sized tree, young branches glabrous or slightly silky with golden pubescence as is the inflorescence, leaves elliptic oblong, acutely serrate 5-7 inches long by 1½-2 inches broad, peduncles axillary subracemose few flowered, sepals unequal, the 3 inner ones longer, petals broad ovate fringed with soft white hairs, scales broad ovate about ½ the length of the

petals densely hairy, stamens as long as petals, filaments subulate, anthers broad reniform, pistil none ; female as in the male, anthers sterile, placentas corresponding in number to the lobes of the stigma, fruit obtusely angled.—*Bl. in Rhumphia* iv. *p.* 22. Hydnocarpus inebrians, *Wight Ill. t.* 16, and *p.* 37 ; and *WA. Prod. p.* 30—(not *Vahl.*)

A very common tree in the plains of Malabar and all the ghat forests on the western side of the Presidency, up to about 2000 feet elevation ; it is called Maravetti in Tamil, and on the Anamallays the Kaders call it Yetti maram ; the fruit is used to intoxicate fish ; the wood is used for various purposes by the natives ; it differs from the true inebrians with which Dr. Wight has confounded it, in the fruit being obtusely angulate, and in the flowers being subracemose instead of cymose. I find however that the young ramuli of this species are generally silky, and the stipules are not as persistent as Dr. Wight's figure would lead one to believe.

3.—H. INEBRIANS, *Vahl.* A large tree, young branches rufo-tomentose, leaves lanceolate acuminate obtusely serrate or subentire, more or less narrowed at the base, sub-oblique, sepals rounded, petals rounded ciliate 1½ lines long, scales rounded acuminate ferrugineo-strigose, berry about 1 inch in diameter subtorulose ferrugineo-tomentose at length black.—*Vahl. Symb. Bot.* iii. *p.* 100. H. venenata, *Gærtn. Fruct. et Pl.* 1 *p.* 288. *tab.* 60. Marotti, *Rheed. Hort. Mal.* i. *p.* 65. *t.* 36 ;—*Thw. En. Pl. Zey.* 18.

Malabar coast, bearing the same name as the preceding species, and possessing the same qualities. Ceylon, up to 2000 feet, called Mākula. The oil extracted from the seed is used in cutaneous complaints.

4.—H. OCTANDRA, *Thw.* A middling sized tree 40-50 feet, bark smooth, young branches strigose tomentose, leaves alternate entire suboblique penniveined ovate lanceolate narrowed at both ends, obtusely acuminate 3-4½ inches long by 1¼-1¾ broad, glabrous above, furnished with black glandular dots beneath and hairy on the costa, petioles ½-¾ inch long, inflorescence stellately pubescent axillary fascicled, fascicles 2-8 flowered, flowers 5 lines broad, pedicels 3-4 lines long, sepals 5 oblong obtuse concave unequal, petals 5 rounded concave ciliate with white silky hairs, scales 5, opposite the petals and ½ their length, rounded obtuse or minutely apiculate sericeous ; flowers male, stamens 8 in 1 series surrounding the rudiment of an ovary, filaments subulate, anthers aduate oblong ; flowers female, anthers sterile, ovary oblong strigose, placentæ parietal 4, style none, stigma large 4 parted, berry spherical tomentose 1½-2½ inches in diameter, seeds 4-12 or more oblong 10 lines long 5 lines broad inmersed in soft pulp.—*Thw. in Hook. Kew. Journ. of Bot. vol.* vii. *p.* 197, and *En. Pl. Zey. p.* 19.

Ceylon in the Ambagamwa district, elevation about 2500 feet.

Analysis of Genera. Pl. ii. *Bixineæ.*

4. Flacourtia inermis, dissections of the hermathrodite flower.
   Flacourtia sapida, female flower ; and young fruit cut transversely.
5. Aberia Gardneri, dissections of male and female flowers.
6. Erythrospermum phytolaccoides, dissections of flowers and fruit.
7. Trichadenia Zeylanica, dissections of flowers and ovary, shewing a flower bud with the calyx bursting irregularly ; a male flower and female flower, a single petal and an ovary cut horizontally.

PITTOSPOREÆ. (By Prof. Oliver.)

Flowers regular, hermaphrodite. Sepals 5, free or slightly connate below, æstivation imbricate. Petals 5, exceeding the sepals free or connate below, more or less spreading above, æstivation imbricate. Stamens 5, hypogynous, free, alternate with the petals ; filaments filiform or linear ; anthers dehiscing longitudinally unappendaged. Ovary 2 rarely 3-5 celled or 1 locular with parietal placentas and indefinite ovules. Style simple, terminal ; stigma minute or capitate, entire or toothed. Fruit a coriaceous capsule dehiscing loculicidally in two valves each bearing a septum on the middle. Seeds albuminous, with a minute embryo, testa smooth or rugose. Trees, shrubs or undershrubs. Leaves alternate simple entire wavy or toothed, exstipulate. Inflorescence various. An unimportant order containing 3 small trees all belonging to the genus Pittosporum.

PITTOSPORUM. BANKS.

Sepals free or slightly united at the base. Petals more or less spreading above, free or connivent or coherent into a tube below. Filaments subulate ; anthers erect, ovate oblong. Ovary nearly or quite divided into 2 (rarely 3 or 5) cells by the projecting placentas. Capsule coriaceous or rather woody, globose or obovoid, dehiscing in two entire septiferous valves. Seeds various in form from mutual pressure, often imbedded in viscous fluid.

PITTOSPORUM FLORIBUNDUM. *WA.* A small tree, leaves thinly coriaceous glabrous elliptic lanceolate to oblongo-lanceolate, subacute or rounded at the apex, margin waved, 3-4 inches long, racemes terminal aggregated many flowered compact, flowers white small, peduncles glabrous, pedicels glabrous somewhat umbellate, sepals minute many times shorter than the corol ovate acute concave ciliate at the apex, petals linear, ovary hairy, style cylindric glabrous, stigmas 2 lobed, ovules 4-6 in each cell of the ovary, capsule size of a pea, nearly black when ripe 2 valved compressed 3-4 seeded, valves thinish, inside transversely wrinkled.—*WA. Prod. p.* 154. P. zeylanicum, *Wight Ill.* t. 173 ; and *Thw. En. Pl. Zey.* p. 68. Celastrus verticellatus, *Roxb. Fl. Ind.* i. 391.

Common along all the Western ghats of the Madras Presidency up to 4000 feet elevation, and in Ceylon ; called Yekkadi in Bombay, and Katteya in Ceylon ; also found in Nepal ; the timber is strong and tough but of small size.

2.—P. TETRASPERMUM. *WA.* A small tree or large shrub, leaves elliptic oblong acute coriaceous glabrous margins slightly waved and recurved, flowers in a terminal sessile umbel, peduncles aggregated into a terminal sessile umbel, usually 1 rarely 2 flowered pubescent, sepals pubescent lanceolate acuminate minute many times shorter than the corol, petals linear, ovary hairy, style glabrous, stigmas 2 lobed, ovules 2 in each cell, capsule nearly globose, when mature compressed 4 seeded, valves thick coriaceous.—*WA. Prod. p.* 154.

Ootacamund and Ceylon, 5000-7000 feet elevation ; flowers in February and March.

3.—P. NEILGHERRENSE. *WA.* small tree or shrub, leaves thinly coriaceous elliptic-lanceolate glabrous, racemes terminal 2-3 together 1-4 flowered lax, peduncles glabrous, pedicels glabrous slender alternate, sepals minute many times shorter than the corol, lanceolate acuminate flat glabrous slightly ciliated, petals linear, ovary hairy, style glabrous, stigma 2 lobed, ovules 4-6 in each cell, capsule yellowish green when mature compressed, 2 valved 4-6 seeded, valves thick between fleshy and coriaceous.—*WA. Prod. p.* 154.

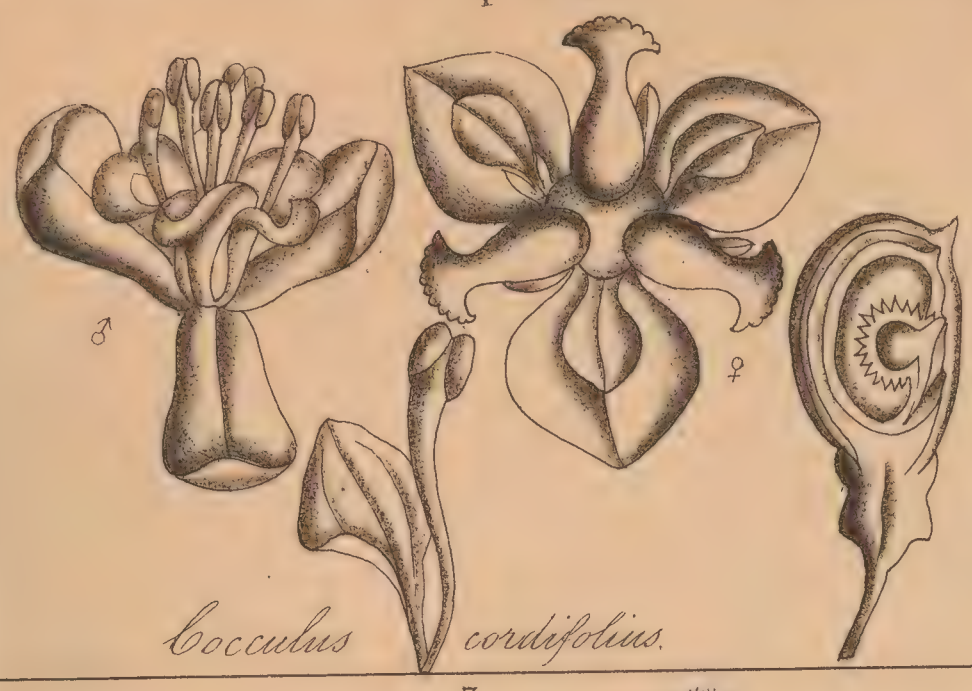
Nilgiris ; the flowers and fruit are much larger than in floribundum.

Analysis of Genera. Pittosporaceæ Pl. ii.

Fig. viii., dissections of flowers and fruit of Pittosporum tetraspermum.

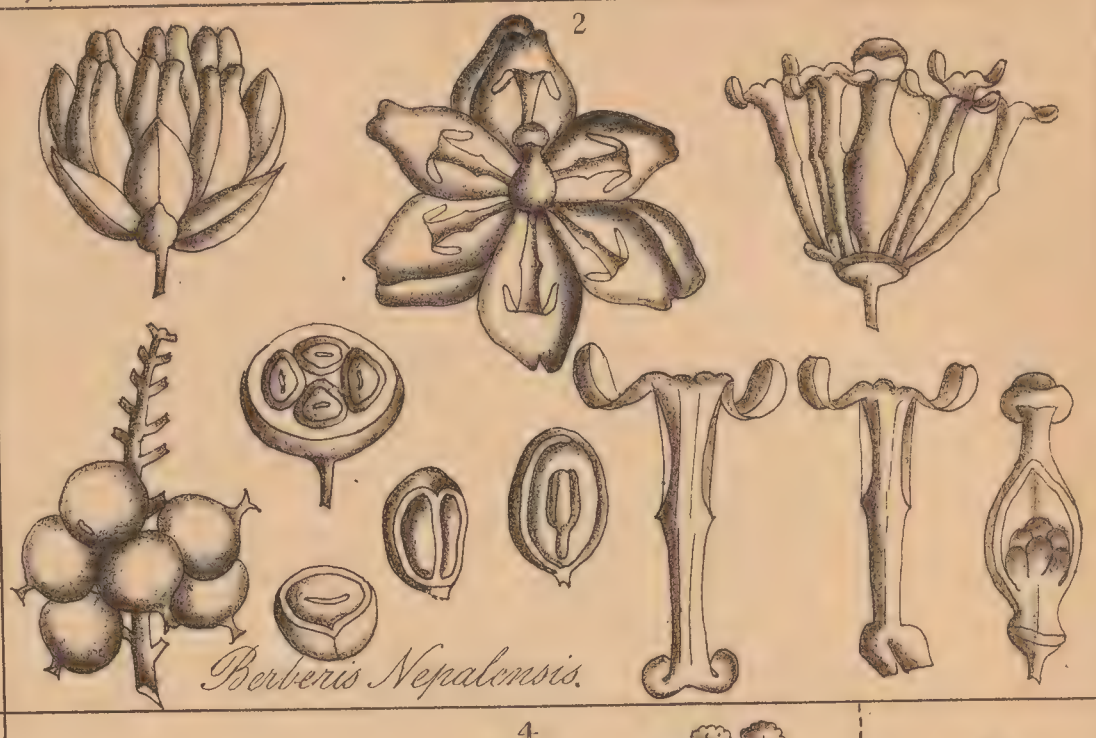
Menispermaceæ. *Berberidaceæ.* *Capparidaceæ.* *Bixineæ.*

1



Cocculus cordifolius.

2

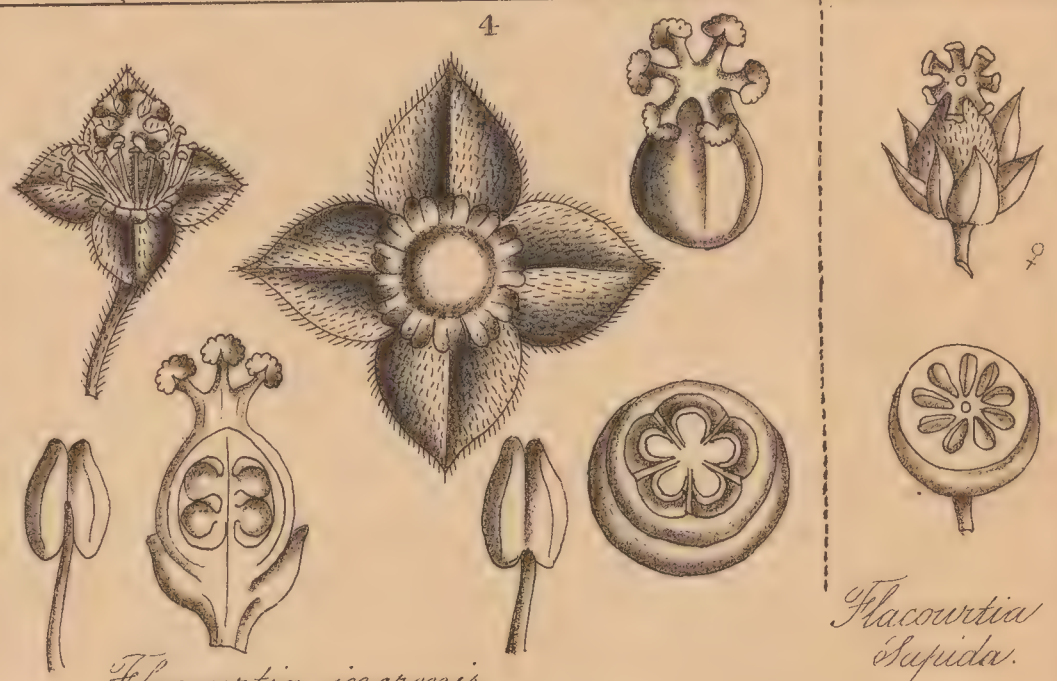


Berberis Nepalensis.

3

Capparis stylosa.

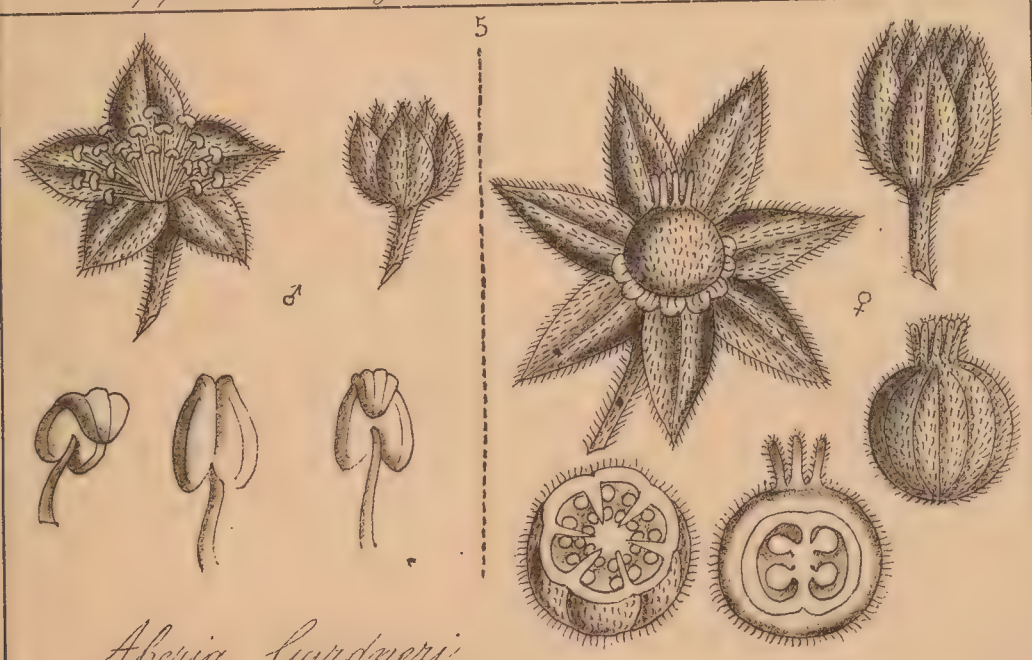
4



Flacourtia inermis.

Flacourtia Sapida.

5

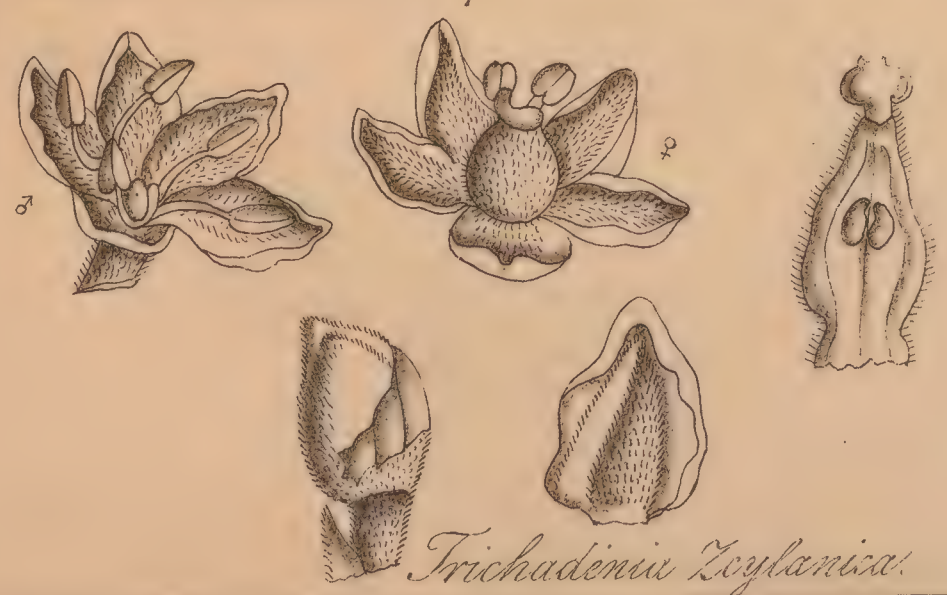


Abcria Gardneri.

6

Erythrospermum phytolaccoides.

7



Trichadenia Zeylanica.

8

Pittosporum tetraspermum.

Gourndoo, del. Dumphy Lith.

ORDER X.—POLYGALEÆ.

Flowers irregular hermathrodite, sepals 5, free or 2 anterior connate, 2 inner larger petaloid wing-like, rarely subequal, petals 3 or 5 declinate free from each other but usually adherent to the staminal sheath, lower petal concave or helmet-shaped; stamens 8 rarely 5, 6 or 4 free or monadelphous, the sheath open above and usually adnate to the base of the petals; anthers 1-2 celled opening by a transverse valve or terminal pore, torus small or expanded with an annular disk, ovary 2-or by abortion 1-celled, rarely 3 celled, style simple often incurved, filiform or variously dilated above; stigma lobed, fruit a compressed 2-celled capsule, dehiscing loculicidally by the margins, baccate and 1-3 celled, or samaroid; seeds pendulous, frequently strophiolate, testa often pilose, embryo axile with flattened cotyledons and a short superior radicle with or without a fleshy albumen. Small trees, shrubs (or herbs), stipules none, leaves alternate rarely opposite simple entire, flowers solitary, spicate, or racemed or rarely panicled.

An order of no importance to the forester. The genus Xanthophyllum is represented by small trees in the peninsula; the genera Polygala and Salomonia yield only herbs or under shrubs.

XANTHOPHYLLUM. Roxb.

Sepals slightly unequal the 2 interior slightly larger, petals 5 free declinate, 4 subequal glabrous, the fifth (or the carina) cymbiform entire pubescent. Stamens 8, all free, or the 2 lower united with the claw of the carina, two distinct inserted opposite to the inner petals, the others attached one to each of the claws of the upper and lateral petals, anthers 2 celled erect opening by a pore, disk hypogynous annulate, ovary 1 celled or imperfectly 2 celled, ovules 2-6 variously inserted, style incurved, fruit globose between coriaceous and fleshy indehiscent 1 seeded, seed subglobose, without a carunculus, exalbuminous, cotyledons thick and fleshy (or albuminous, cotyledons subfoliaceous) radicle short small. Trees or shrubs glabrous; leaves alternate coriaceous, racemes axillary, supra axillary, or terminal. *Roxb. Fl. Corom.* iii. *t.* 24. Jackia, *Bl. Bijdr. (non Wall.)*

1. Xanthophyllum Arnottianum, *Wight.*—A small tree, leaves elliptic oblong with a short blunt acumination 3 to $4\frac{1}{2}$ inches long by 1-$1\frac{3}{4}$ broad, furnished with 2 concave pore-like glands near the base and several scattered over the under surface, racemes axillary and terminal puberulous 2-4 inches long often panicled, ovules 8-12 attached by pairs to two lateral placentæ, fruit globose 1 seeded. *Wight Ill. p.* 50. X. flavescens, *WA. Prod. p.* 39. (*not Roxb.*)

Western slopes of the Nilgiris, Malabar, &c.

2. X. angustifolium, *Wight.*—A small tree, leaves narrow lanceolate elliptic obtuse or acuminated glabrous, racemes axillary and terminal shorter than the leaves, ovary 1 celled 4 ovuled, two ascending from the base and two pendulous from the apex of the cell. *Wight Ill. p.* 50, *tab.* 23. X. undulatum, *Wight l. c. p.* 50. X. Roxburghianum, *Wight l. c. p.* 50.

Courtallum, Bolumpatty valley (Coimbatore.)

X. virens, *Roxb.*—A small tree, leaves elliptic oblong with a longish acumination often undulate on the margin, shining above, about 4 inches long by $1\frac{1}{4}$-$1\frac{1}{2}$ broad, glandular pores more or less over the whole under surface, but also often present at the base near the insertion of the petiole, petioles 2-3 lines long, racemes puberulous solitary or twin in the axils and terminal, shorter than the leaves, ovules 4, one pair attached to the walls of the cavity on each side some way above the base. *Roxb. Fl. Ind.* ii. *p.* 221. X. flavescens, *Wight Ill. p.* 50 (*not Roxb.*)

Paupanassum Hills, 2—3,000 feet. Ceylon. Roxburgh mentions that it grows to a large tree in Sylhet, but it appears always to be small in Southern India. Wight figures the ovules wrong (as erect from the base); in all the flowers that I have dissected of Ceylon and Tinnevelly specimens, they are attached to the sides of the walls of the cavity some way above the base.

I know nothing of the timber or other uses of these three trees, but the former is too small to be of any use; they are all closely allied and scarcely distinguishable except by the position and number of their ovules.

Analysis. Pl. III. *fig.* 2.

1. Flowers and ovary of X. angustifolium.
2. Ovary of X. Arnottianum.
3. Ovary of X. virens.

ORDER XI.—TAMARISCINEÆ.

Flowers regular generally hermathrodite, sepals 5 rarely 4 or 6 free or connate at the base, imbricate, petals as many inserted under the disk, imbricate, free or joined into a tube at the base, disk hypogynous or slightly perigynous 10-glandulous, crenate or angulate rarely obsolete, stamens 5-many inserted on to the disk free or variously connate at the base, anthers 2-celled versatile generally apiculate, cell dehiscing longitudinally, ovary free 1 celled or imperfectly partitioned, styles 3-5 stigmatose at the apex, free or connate, or as many stigmas sessile, placentas as many as the styles, only at the base of the cavity or reaching to the apex, ovules 2-many erect from the base anatropal, capsule dehiscent, seeds with a sessile or stipitate crest of long hairs, or without a crest and covered with long hairs or winged, albumen none, or (in extra Indian genera) subfleshy or very thin, embryo straight, cotyledons plane, radicle inferior short. Small trees or shrubs, leaves alternate small squamiform, stipules none.

A small order of no importance.

TAMARIX. Linn.

Sepals 4-5 rarely 6 free, petals as many inserted under the disk free or slightly connate at the base, stamens 5-10 rarely 4 or 11-12 inserted on to the disk free or scarcely joined into a ring at the base, ovary attenuated at the apex, styles 3-4 rarely 2 or 5 short thick, placentas short at the bottom of the cavity of the ovary, many ovuled. Seeds many small glabrous with a straight beak, feathered with long spreading hairs, or not beaked but with a simple pappus-like coma at the apex, albumen none, embryo conforming to the seed, ovoid-oblong. Small trees or shrubs, leaves amplexicaul or sheathing, flowers white or rose, spicate or densely racemose. *Linn. Gen. n.* 375. Trichaurus, *Arnt. WA. Prod. p.* 40.

1. Tamarix ericoides, *Rottl.*—A shrub or small tree, young leaves sheathing, spikes terminal, bracts equalling the pedicel flowers large, rose colored, stamens 10, the alternate ones shorter inserted between and alternating with the teeth of the torus, filaments distinct not connected by a membrane, seeds rostrate, break straight feathered with long spreading hairs. *Rottl. and Willd.* Trichaurus ericoides, *WA. Prod. p.* 40. Myricaria vaginata, *DC. Prod.* iii. *p.* 98.

A beautiful shrub or small tree found in beds of rivers in the Madras Presidency, Bombay and Ceylon; it has rather large heath-like flowers and is cultivated in gardens.

2. Tamarix gallica, *Linn.*—A small tree, trunk sometimes up to 3 feet in circumference, 6-12 feet high crooked, bark scabrous, branches numerous erect or somewhat pendulous, their bark greenish, leaves minute pressing close to the branchlets subulate acute from a triangular amplexicaul base rarely over 2 lines long, flowers very numerous crowded in slender lateral and terminal spicate racemes forming large beautifully drooping paniculate masses of flower, pedicels equalling or shorter than the calyx from a scale like bract, sepals ovate deltoid entire or minutely denticulate, much shorter than the free petals, stamens 5 equal twice as long as the petals, styles 3 articulated at the division lobes at length divergent. *DC. Prod.* iii. 96. Tamarix Indica, *Roxb. Fl. Ind.* ii. *p.* 100. (excl. syn. Vahl.) *Wight Ill.* i. *t.* 24.

Found in sandy beds of rivers and near the sea coast in the Madras Presidency, Bengal and Ceylon, it is very ornamental and is cultivated in gardens; in Bengal it is called Jhao, and is largely used for Railway and Steamer fuel, the wood is reddish and coarse grained and in use for several purposes.

3. Tamarix dioica, *Roxb.*—A small tree, diœcious, trunk short, bark dark colored cracked, branches very numerous spreading and drooping, leaves tubular sheathing obliquely truncated pointed smooth more like joints of the bark than leaves, spikes terminal simple cyclindric often drooping numerous and forming beautiful drooping masses, flowers diœcions, very numerous sessile small rose-colored inodorous, bracts triangular acute 1 flowered, stamens 5. Male flowers with a small 3-lobed rudiment of an ovary; female flowers with saggitate sterile anthers, ovary 3 lobed, styles 3 longer than the corol stigmas clavate recurved. *Roxb. Fl. Ind.* ii. *p.* 101.

In the beds of rivers in the Madras Presidency and Bengal, and introduced into gardens; it is highly ornamental and in flower almost all the year, in Bengal it is called Lal Jháo.

4. Tamarix articulata, *Vahl*, with articulated branchlets, leaves reduced to a sheath and oblique point, and with interrupted racemes, is a small tree found in Bengal.

Analysis of Genera, Pl. III, *fig.* 1.

Dissections of the flower of Tamarix ericoides.

ORDER XII.—GUTTIFERÆ.

Flowers regular, diœcious, polygamous or hermathrodite, sepals 2-6 imbricate or in decussate pairs, petals 2-6 rarely more, usually much imbricated or contorted. Male flower stamens usually indefinite, hypogynous, filaments free or variously connate, monadelphous or in as many phalanges as petals, anthers various. Female flower staminodia various, ovary 1-2 many celled, ovules 1-2 or many axile, or erect from the base of the cavity (rarely parietal in one extra-Indian genus) stigmas as many as the cells of the ovary or variously consolidated, sometimes peltate entire, sessile, subsessile, or with more or less elongate style, fruit an indehiscent berry or drupe with a fleshy or pulpy pericarp, or a capsule opening in as many valves as cells. Seeds large exalbuminous often arillate. Embryo of a large radicle with small or obsolete cotyledons, or of thick fleshy cotyledons and very short inferior radicle. Trees often abounding with yellowish or green juice, leaves opposite rarely verticelledate thickly coriaceous entire.

A most important order containing the valvable poon spar (Calophyllum elatum) and other species of that genus; the different species of Mesua which yield the Iron wood of Ceylon and Southern India, and the Gamboge trees, (Garcinias).—The mangosteen belongs to the order.

Tribe 1. *Garcinieæ.*—Embryo consisting of a large fleshy radicle with small or obsolete cotyledons.

Garcinia, Xanthochymus, Ochrocarpus.

Tribe II, Calophylleæ.—Embryo consisting of thick fleshy cotyledons and very short inferior radicle.

Calophyllum, Kayea, Mesua.

GARCINIA. Lam.

For Gen. Char. see letter press of the plate of G. Cambogia, Pl. lxxxv.

1. Garcinia purpurea, *Roxb.*—A tall slender tree with drooping branches, leaves dark green, red when young obovate lanceolate acuminate. Male flowers longish pedicelled aggregated 4 8 congested in the terminal axils 2-4 in the lateral ones, column of stamens short capitate filaments free for a short distance at the apex, anthers few (12-20) occasionally one or two in the centre simulating a rudimentary, ovary oblong 2 celled dehiscing longitudinally, fruit globose not furrowed 4-8 seeded deep purple.

This tree is found in the Wynad and Coorg and on the Bombay ghats, the fruit is eaten, and has an agreeable acid flavour; a syrup is also made from it, and the seeds furnish a concrete oil called Kokum in the Bombay Presidency.

2. GARCINIA, *Sp.*—A small tree, leaves subspathulate very obtuse, dark green above paler beneath, 3-4 inches long by $\frac{3}{4}$ to 1 inch broad; petioles nearly 1 inch long, primary veins very straight at nearly right angles with the mid rib, veinlets forming a regular net work of small paralellogram-shaped areoles; flowers subsessile in the terminal axils, fruit (young) narrow oblong crowned with the very large rough peltate stigma which has a repand margin.

I have only found this tree on the Calcad Hills close to the coffee estates at an elevation of about 3,000 feet; I only procured it in young fruit; a yellow pigment exudes from every portion of the tree; it probably belongs to the section Peltostigma.

3. GARCINIA MORELLA, *Desrous.*—For description, &c., see Plate lxxxvi.

4. GARCINIA PICTORIA, *Roxb.*—For description, &c., see Plate lxxxvii.

5. GARCINIA CONICARPA, *Wight.*—Leaves subspathulate very obtuse longish petioled, flowers subsessile in the terminal axils, fruit conical 4 seeded, 4 furrowed, furrows angular. *Wight Icones, tab.* 121.

Sivagherry mountains. I do not know this tree unless it is a form of G. Cambogia; the shape of the leaves is much like my No. 3, but the apex of the fruit is quite different.

6. GARCINIA ECHINOCARPA, *Thw.*—A good sized tree, 40-50 feet, diœcious, leaves coriaceous, oblong or lanceolate acuminate, $2\frac{1}{2}$-5 inches long, $1\frac{1}{2}$-3 broad, petioles 5-8 lines long sulcate above, flowers terminal sessile pale yellow, sepals thick concave petals oblong. Male, numerous aggregated, female solitary, male stamens with the filaments joined below on to a 4-sided androphore, or disk, above free, anthers subquadrate reddish, female, sterile stamens joined into one series at the base, free above, ovary covered with numerous imbricated fleshy scales, stigma subsessile peltate irregularly lobed, lobes tuberculate, fruit subspherical, echinately muricate, 1-3 seeded, 1-$1\frac{1}{2}$ inches long, seeds oblong, testa coriaceous reddish brown. *Thw. Hook. Journ. of Bot., Vol. VI, p.* 71;—*En. Pl. Zey. p.* 49.

Vary. β.—Leaves very coriaceous obovate or oblong retuse or with an obtuse short acumination.

Ceylon, in the forests between Galle and Ratnapoora, at no great elevation. Variety *β.* in the Central Provinces at 4,000—6,000 feet elevation. A thick oil is extracted from the seeds, which the Cingalese burn in their lamps, but it gives an indifferent light; the tree is called Madol. This species is well distinguished by the scales on the ovary, which subsequently become the echinulations of the ripe fruit.

7. GARCINIA TERPNOPHYLLA, *Thw.*—A middling sized tree, diœcious, leaves lanceolate, narrowed at both ends sometimes with a longish obtuse acumination penniveined 3-4 inches long by 1-$1\frac{1}{4}$ broad, red when young, petioles 4 lines long, flowers axillary fascicled or subumbellate $3\frac{1}{2}$ lines long yellowish, male stamens numerous congested on to a 2 or 4 lobed disk, anthers 2-3-4 (generally 2) on each lobe, cells horizontal subimmersed, a small rudiment of an ovary, female, sterile stamens about 18 squamiform encircling the base of the ovary; ovary 2 celled, stigma peltate sublobate, fruit fleshy by abortion 1-celled 1-seeded, seed fixed by the middle, testa membranaceous. *Thw. En. Pl. Zey. p.* 406. Terpnophyllum Zeylanicum, *Thw l. c. p.* 49. Discostigma Zeylanica et acuminata, *Pl. et Tr. in Ann. Sc. Nat. series* iv. *t.* 14, *p.* 364;—*Walper's Ann. t.* vii. *fasc.* iii. *p.* 353.

Vary. *α. lanceolatum*, leaves lanceolate stamen disk 2 lobed, lobes bifid sulcate in the middle.

Vary. *β. acuminatum*, leaves lanceolate with a long obtuse acumination, stamen disk 4 lobed.

Ceylon. Variety *α* is found in the Central Provinces at an elevation of 2,000—4,000 feet. Variety *β* in the forests between Galle and Ratnapoora, at no great elevation; they are very beautiful trees, with the young foliage of bright red color. The timber weighs 58-60 lbs. the cubic foot when seasoned, it is well adapted for bridge building and large framing, it is easily worked, but apt to split, so unfit for joiner's work.

I have united the G. papilla of Wight with the common G. Cambogia, (vide letter press to plates) as I cannot distinguish them, and I strongly suspect conicarpa is also only a form of that species; if otherwise, it is strange that I have not met with it.

XANTHOCHYMUS. ROXB.

For Gen. Char. see letter press to plate of X. pictorius, Pl. lxxxviii.

1. XANTHOCHYMUS PICTORIUS, *Roxb.*—For description, &c., see Plate lxxxviii.

2. XANTHOCHYMUS OVALIFOLIUS, *Roxb.*—A middling sized tree, leaves shining ovate or almost rotundate, with the apex rounded or retuse to lanceolate more or less acuminate $3\frac{1}{2}$-$5\frac{1}{2}$ inches long by $1\frac{3}{4}$ to $2\frac{1}{2}$ broad, petioles $\frac{1}{4}$ to $\frac{1}{2}$ inch long, flowers lateral fascicled male and bisexual mixed, anthers about 6 8 to each bundle, ovary 3 celled, fruit oval size of a walnut with a smooth green rind and full of yellow juice, 1-3 seeded. *Roxb. Fl. Ind.* ii. *p.* 632;—*WA. Prod. p.* 102. ?X. spicatus, *WA. l. c.* Stalagmitis ovalifolius, *G. Don.*

Bombay, Canara, Malabar, and Travancore ghat forests, and in Ceylon, a tenacious gummy matter exudes from the trunk, but it is of no value. The tree is called Ellagokatee in Ceylon, it is a very elegant, straight, uncommonly ramous tree, and has been cultivated in the Botanical Gardens in Calcutta, where the trees began to blossom abundantly in the hot season, when from 7 to 10 years old, and produced ripe fruit at 10 years.

OCHROCARPUS. THOUARS.

For Gen. Char. see letter press to plate of O. longifolius, Pl. lxxxix.

1. O. LONGIFOLIUS, *Benth.* and *Hook.*—For description, &c., see Plate lxxxix.

CALOPHYLLUM. LINN.

For Gen. Char. see letter press to plate of C. elatum (Plate 2.)

Sepals 4, *Petals* 8.

1. CALOPHYLLUM WALKERI, *Wight.*—A large tree, branches terete, leaves nearly round or obcordate, very thick and coriaceous, racemes axillary congested on the ends of the branches, the extreme ones (from the abortion of the leaves) forming a terminal panicle, exterior pair of sepals much smaller than the interior, inner row of petals smaller than the outer, fruit spherical, about the size of a pretty large cherry, pericarp very thick and coriaceous.—*Wight Ill. p.* 128.

Ceylon, most elevated parts of the island ; a very handsome tree. An oil is extracted from the seeds of this and of all the other species, which is used for burning.

2. CALOPHYLLUM CUNEIFOLIUM. *Thw.*—A large tree, branchlets glabrous, leaves small coriaceous cuneato-spathulate obtusely acuminate or retuse, $1\frac{1}{4}$-$1\frac{3}{4}$ inches long, 5-9 lines broad, petiole 3-4 lines long, flowers of middling size, sepals 4, petals 8 (or occasionally only 4 ?), fruit spherical 8 lines in diameter. *Thw. En. Pl. Zeyl. p.* 51 *and* 407.

Ceylon, 3,000 to 4,000 feet elevation.

Sepals 4, *Petals* 4.

3. CALOPHYLLUM THWAITESII, *Pl. et Tr.*—A good sized tree, leaves from obovate-oblong rounded at the base, to cordate orbicular, racemes axillary and from the scars of the fallen leaves few flowered, sepals 4, petals 4, stamens very short, fruit spherical, *Planch. et Triana. in Ann. des Scien. Nat. ser.* 4, xv. p. 260 ;—*Thw. En. Pl. Zey. p.* 407. C. decipiens, *Thw. En. Pl. Zey.* 51, *(excl. syn.)*

Ceylon, at an elevation of 1,000 to 2,000 feet.

4. CALOPHYLLUM CORDATO-OBLONGUM, *Thw.*—A very large tree, branches tetragonal glabrous (young ones with the petioles and peduncles ferrugineo-pilose), leaves oblong obtuse, slightly narrowed at the base, cordate, 4-6 inches long by 2-3 inches broad, the parallel veins a little prominent on both sides, petioles 2-3 lines long, panicles terminal about equal to the leaves, pedicels and flower buds furnished with pale fulvous tomentum, sepals 4, the 2 interior larger and petaloid, petals 4, orbicular $\frac{1}{2}$ an inch long. *Thw. En. Pl. Zey.* p. 407.

A very handsome tree. Ceylon, Hinidoon pattoo ; in flower in September.

5. CALOPHYLLUM TRAPEZIFOLIUM, *Thw.*—A large tree, branches glabrous, leaves coriaceous small ovato-trapeziform obtusely and shortly acuminate or retuse, $1\frac{1}{2}$-2 inches long by 7-11 lines broad, petioles 3-4 lines long, racemes much longer than the leaves flowers rather large, sepals 4, petals 4, fruit subspherical 8 lines long, 7 lines broad. *Thw. En. Pl. Zey. p.* 51.

Ceylon, Central Provinces, 4,000—5,000 feet elevation, in the Hunasgiri district.

6. CALOPHYLLUM INOPHYLLUM, *L.*—A middling sized tree, branches terete, leaves elliptical passing into obovate, sometimes, emarginate, racemes axillary loose, sepals 4, exterior smaller interior about equal to the petals (pure white) all petaloid, petals 4, stamens numerous irregularly polyadelphous near the base, ovary globose (reddish purple), elevated on a short gynophore, fruit spherical, about the isze of a large cherry. *Wight Ill.* p. 128.

A very beautiful tree, sometimes called the Alexandrian laurel ; in Malabar it is called Pine by the natives, in Teligu Poonas in Hindoostani Sultan Champa, and in Ceylon Domba. It is very common in Malabar, and is largely planted in many parts of the Madras Presidency, particularly near the coast ; the flowers are delightfully fragrant, the wood though coarse grained is considered very valuable for some purposes in ship-building ; the seeds afford a good lamp oil.

7. CALOPHYLLUM TOMENTOSUM, *Wight.*—A good sized tree, young shoots square and with the petioles and peduncles thickly clothed with ferruginous tomentum, leaves varying from oval to narrow lanceolate attenuated at both ends undulated on the margin racemes axillary, loose, few flowered, sepals 4, petals 4. *Wight Ill. p.* 128 ;—*Thw. En. Pl. Zey. p.* 51.

Ceylon, 3,000 to 5,000 feet elevation, very abundant; the timber is valued for building purposes, and the seeds are largely collected for their oil which is called "Keenà tel."

8. CALOPHYLLUM BRACTEATUM, *Thw.*—A very large tree, young branches square pendulous furnished with caducous ferruginous tomentum, leaves lanceolate acuminate, $3\frac{1}{2}$-8 inches long by 1-$2\frac{1}{4}$ broad, petioles 2-4 lines long, young ones pilose with caducous tomentum, racemes conspicuously bracteated tomentose, much shorter than the leaves 4-8 flowered ; pedicels 1 bracteated at the base, bractes oblong tomentose 2-3 lines long, flowers 4 lines in expansion, fruit (immature) oblong. *Thw. En Pl. Zey. p.* 51.

Ceylon, Saffragram district, at no great elevation on the banks of streams.

9. CALOPHYLLUM ELATUM, *Bedd.*—For description, &c., see Plate ii.

Sepals 4, *Petals* 0.

10. CALOPHYLLUM WIGHTIANUM, *Wall.*—For description, &c., see Plate xc.

11. CALOPHYLLUM MOONII, *Wight.*—A large tree, young branches terete clothed with fugacious ferruginous tomentum, leaves linear-lanceolate acute 8-12 inches long by $1\frac{1}{2}$ broad, floral ones about oval, flowers short pedicelled forming numerous short umbellate panicles, panicles axillary solitary congested towards the ends of the branches forming together large leafy terminal panicles, sepals 4 the interior pair the larger, petals 0, fruit spherical. *Wight Ill. p.* 129 ;—*Thw. En. Pl. Zey. p.* 52.

Ceylon, in the forests between Galle and Ratnapoora, at no great elevation ; a tree of great beauty, called Doomba-Keena.

12. CALOPHYLLUM BURMANNI, *Wight.*—Young shoots square tomentose, leaves oval or slightly obovate spathulate sometimes subemarginate, panicles small axillary few flowered, pedicels opposite usually larger than the peduncles, furnished at the base with a small deciduous bractea, sepals 4, petals 0, fruit small globose or very slightly oval reddish brown $\frac{1}{2}$ an inch in diameter. *Wight. Ill. p.* 129 ;—*Thw. En. Pl. Zey. p.* 52.

Ceylon, hotter parts of the island.

KAYEA. Wall.

For Gen. Char. see letter press to plate of Kayea stylosa, Pl. cii.

Kayea stylosa, *Thw.*—For description, &c., see Plate cii.

MESUA. Linn.

For Gen. Char. see letter press to plate of Mesua Coromandelina, Plate lxiv.

1. Mesua Coromandelina, *Wight.*—For description see letter press to plate of this species, Pl. lxiv.

2. Mesua speciosa, *Choisy.*—A lofty tree, leaves narrow lanceolate attenuated at the base and ending in a longish blunt acumen dark shining green above, and glaucous-white beneath, 5-8 inches long by 1-1½ broad, petioles ¼ to ½ inch long; flowers subsessile 3-4 inches in expansion, petals roundish regular; ripe fruit 4 seeded. *DC.* 1 *p.* 562;—*Rheede Hort. Mal.* 3. *t.* 53. *excl. syn.*

A common tree in all the western forests of the Madras Presidency, up to nearly 5,000 feet; it is well known by the names of Nàgà, nàng, and nàngal, which names are also applied to the other species. All the mesuas yield a very hard reddish colored wood known as iron wood, and the timber of the different species are not distinguishable; they are very showy trees, and are much planted for ornament about temples in hilly places by natives. The timber is most valuable for engineering purposes, but is as yet but little utilized; the seeds yield an oil which is used for burning.

The Ceylon tree referred to this species by Dr. Thwaites, has been separated by Messrs. Planchon and Triana under the name of M. Thwaitesii.

3. Mesua ferrea, *Linn.*—A very large beautiful tree, with slender pendulous ramuli, leaves lanceolate acute at both ends ending in a long tapering acumen bright shining green above, beneath white from a thick coating of pulverulent incrustation; flowers yellow axillary solitary subsessile. *Linn. sp.* 734;—*Wight Ic. t.* 118.

Vary. *α.* leaves lanceolate.

Vary. *β.* leaves linear.

The broad leaved variety is found both in Ceylon and on the Nilgiris, Anamallays, and other parts of the peninsula; the narrow leaved variety I have only seen from Ceylon. They are both made into new species by Messrs. Planchon and Triana, the former being called M. Walkeriana, and the latter M. salicina; the name of ferrea being, I suppose, retained for the next species, which is the ferrea of Roxburgh but not of Linneæs. The young leaves are of a very brilliant red color, the timber is very durable under water; it is straight grained hard and difficult to work; when seasoned it weighs about 75 lbs the cubic foot.

4. Mesua Roxburghii, *Wight.*—A large tree, branches rather rigid, leaves lanceolate shortly acuminate bright shining green above, glaucous beneath, flowers terminal solitary or paired (one from the axil of each terminal leaf) short pedicelled, petals subunguiculate obcordate curled on the margin, capsule about the size of a crab apple, nearly round with an acute point 1-celled 1-4 seeded the partition nearly obliterated 2 valved. *Wight Ill.* p. 127. M. ferrea, *Roxb. Fl. Ind.* ii. 605, *not Linn.*

Calcutta, Eastern Bengal, Orissa, and northern parts of the Circars. Much cultivated about temples and in gardens on the eastern side of the Madras Presidency. The tree differs from the true M. ferrea of Ceylon in having a more rigid habit, and in the flowers being solitary, or at the most only one pair at the apex of the branches, instead of occupying the axils of many pairs of leaves all along the branch.

5. Mesua sclerophylla, *Thw.*—A large tree, leaves very coriaceous almost veinless, lanceolate or oblongo-lanceolate acuminate, rounded at the base dark shining green above, very white beneath, 3-4 inches long by ¾-2 inches broad, petioles 2-3 lines long, flowers of middling size axillary and terminal, solitary on short peduncles. *Thw. En. Pl. Zey p.* 407. M. speciosa, vary. *β.*, *Thw. l. c.p.* 50.

Ceylon, in the Reigam Corle, allied to Mesua speciosa, but with smaller leaves rounded at the base.

6. Mesua pulchella, *Pl. et Trian.*—A Ceylon tree nearly allied to M. Coromandelina, but with its leaves destitute of the white coating on the under side. *Thw. En Pl. Zey. p.* 406. Mesua Coromandelina, *Thw. En. Pl. Zey. p.* 50—(*not Wight.*)

Ceylon, in the damp forests between Galle and Ratnapoora, at Ambagamwa and elsewhere at no great elevation.

ORDER XIII.—TERNSTRÆMIACEÆ.

Flowers regular hermathrodite or rarely unisexual, sepals 5 (rarely 6-7) free or shortly connate imbricate the inner often larger, petals 5 (rarely 6 9) hypogynous free or often united in a ring or short tube at the base contorted or otherwise imbricate, stamens indefinite, rarely equal in number to the petals and alternate with them, hypogynous free or shortly united at the base with each other, or with the base of the petals, anthers 2 celled basifixed or versatile, disk 0. Ovary free, rarely half inferior 2-3-5-many locular, with 2 or more ovules in each cell, styles as many as the cells of the ovary free or partially or wholly united into a single style, sometimes very short with as many stigmatic lobes as cells of the ovary, fruit coriaceous or woody and indehiscent, or capsular. Seeds with or without albumen, embryo variously curved or straight. Trees or shrubs, leaves alternate or opposite undivided entire or serrate exstipulate (or rarely stipulate.)

This order, to which belongs the tea and camelia, contains several valuable Indian timber trees. The Ternstræmia gymnanthera and Gordonia obtusa both yield valuable timber and are both abundant in mountainous districts on the western side of the Presidency. Pæciloneuron Indicum is a valuable timber tree common in South Canara and Malabar, and Pæciloneuron pauciflorum a valua-

ble timber tree inhabiting the Travancore and Tinnevelly mountains. Eurya Japonica is a shrub or small tree much resembling the tea plant in leaf; 2 other species of Gordonia are Ceylon trees, and a second species of Ternstræmia (a shrub) inhabits that island; and one species of Adinandra (a middling sized tree.)

TERNSTRÆMIA. Linn.

For Gen. Char. see letter press to plate of T. gymnanthera, Pl. xci.

1. Ternstræmia gymnanthera, *WA.*—For description, &c., see Plate xci.

2. Ternstræmia emarginata, *Gard. in Cal. Journ. of Nat. Hist. vol.* vii. *p.* 447.—A glabrous shrub, 10-16 feet in height, not uncommon in the more elevated parts of Ceylon.

ADINANDRA. Jack.

Flowers hermathrodite, sepals broadly imbricate (the 2 outer passing into bracteoles), petals 5 imbricate connate at the base or free, stamens indefinite variously connate at the base, often hirsute, anthers erect basifixed, ovary 3-5 celled sometimes imperfectly, styles elongate consolidated into 1, entire or shortly 3-5 fid, ovules very numerous in each cell, placentas prominent, fruit indehiscent, seeds many small, albumen fleshy, embryo inflexed. Evergreen trees, leaves alternate, flowers solitary axillary pedunculate.

Adinandra lasiopetala, *Wight.*—A middling sized tree, branches terete minutely strigose, leaves oblongo-lanceolate obtuse or subacuminate retuse revolute at the margin minutely denticulate glabrous above, beneath minutely and sparingly strigose 2¼-4 inches long ¾-1 inch broad, peduncles axillary solitary, 1 flowered about 8 lines long, drooping, thickened at the apex, flowers 6-8 lines in diameter externally sericeo-strigose, filaments variously connate sprinkled as are the anthers with longish hairs, petals white, ovary imperfectly 3 celled, fruit globose about 5 lines in diameter, Cleyera lasiopetala. *Wight Ill. p.* 99. Eurya lasiopetala, *Gardn. in Calc. Jour. of Nat. Hist. vol.* vii. *p.* 446. Sarosanthera lasiopetala, *Thw. En. Pl. Zey. p.* 41. Adinandra lasiopetala, *Benth. and Hook. Gen. P.*. 1. *p.* 182, and *Thw. En. Pl. Zey. p.* 405.

Ceylon, 6,000 feet and upwards. A middling sized tree.

Analysis of Genera Pl. III, fig. 3.

Flower, and young fruit and dissections of the flower and ovary, &c. of Adinandra lasiopetala, (the dissections of the ovary are from a drawing communicated by Dr. Thwaites.)

EURYA. Thunb.

For Gen. Char. see letter press to plate of Eurya Japonica, Pl. xcii.

1. Eurya Japonica, *Thunb.*—For description, &c., see Plate xcii.

GORDONIA. Ellis.

For Gen. Char. see letter press to plate of G. obtusa, Pl. lxxxiii.

1. Gordonia obtusa, *Wall.*—For description, &c., see Pl. lxxxiii.

2. Gordonia Zeylanica, *Wight.*—A middling sized tree, glabrous, leaves sessile quite entire from elliptic to oblong lanceolate acute tipped with a small retuse glandular point, flowers axillary on short peduncles, petals 5 obcordate, stamens very numerous, anthers oblong, ovary hairy, stigmas 5 clavate. *Wight Ill. p.* 99 ;—*Thw. En. Pl. Zey. p.* 40.

Ceylon, 4,000 to 7,000 feet ; this species (as also does the Peninsula G. obtusa) varies very much in the size and shape of the leaves and size of the flowers.

3. Gordonia speciosa, *Gard.*—A large tree, 40-50 feet, branches terete glabrous, leaves entire sessile coriaceous glabrous elliptic or ovate retuse 3-4½ inches long by 1½ to 2¾ broad, flowers large axillary sessile or shortly pedunculate, petals cordate, reddish purple 1½-2 inches long. Carria speciosa, *Gard. in Calc. Journ. of Nat. Hist.* vii. 7. Gordonia speciosa, *Thw. En. Pl. Zeyl.* p. 40.

Ceylon, rather uncommon, in damp forests 5,000 feet and upwards.

PÆCILONEURON. Bedd.

For Gen. Chár. see letter press to plate of Pæciloneuron Indicum, Pl. iii.

In dissecting a quantity of flowers of P. Indicum, I find that the stamens (though sometimes in a single series free or variously united at the base) are generally in 2 series seated on the receptacle round the base of the ovary. P. pauciflorum has 4 unequal sepals, the 2 outer being much smaller than the 2 inner, 6 imbricate (not contorted) petals, and stamens 16-22 in 2 series seated on an evident torus at the base of the ovary, so that if this species remains in the genus, the generic character must be considerably altered. I have not seen the fruit of P. Indicum, and only one of pauciflorum, it was round, ¾ of an inch in diameter, dehiscent into 2 coriaceous valves and 1 seeded.

1. Pæciloneuron Indicum, *Bedd.*—For description, &c., see Plate iii.
2. Pæciloneuron pauciflorum, *Bedd.*—For description, &c., see Plate xciii.

Analysis of Genera, Pl. III, fig. 3.

Adinandra lasiopetala.

ORDER XIV.—DIPTEROCARPEÆ.

Flowers regular hermathrodite ; calyx 5-fid or 5-parted, lobes imbricate or subvalvate in fruit usually enlarged, one or more growing into a wing ; petals 5 contorted connate at the base or free, stamens very numerous in many series or 5-10 or 15 in 1 or 2 series inserted on to an hypogynous (rarely a subperigynous) torus, filaments often dilated below free or slightly connate, or rarely cohering with the petals, anthers erect 2 celled with equal valves or the inner shorter, dehiscing longitudinally or towards the apex connective often produced into a long beak or bristle ; ovary free with a broad base or slightly adherent 3 celled with 2 ovules in each cell ; style entire or obsoletely 3-fid, ovules twin in the cells pendulous or fixed laterally, anatropous or subanatropous, raphe ventral, micropyle superior ; fruit free or included in the enlarged calyx, indehiscing or rarely dehiscing by 3 valves, 1-2 seeded ; seed exalbuminous, embryo with equal or unequal straight or plicate thick or foliaceous cotyledons. Trees, often resinous, leaves alternate entire or sinuately dentate, stipules generally small and deciduous, or (in Shorea) sometimes coriaceous and persistent, or (in Dipterocarpus) large and soon deciduous ; flowers in axillary few or many flowered panicles.

A most important forest order including many of the giants of the forest in India, Ceylon, Birmah and the Archipelago. Dipterocarpus is only represented in the Peninsula by one species, a gigantic tree, but Ceylon possesses 6 *species, and the genus is abundantly represented in Eastern Bengal and Birmah and most or all of the species, yield a valuable wood oil, but their timbers do not appear to be of much value.—Vatica has also only* 1 *representative in the Peninsula,* 2 *additional ones in Ceylon, and about* 6 *beyond our limits. Shorea or Sàl has* 3 *Peninsula species, all very valuable for their timber (one the "robusta" being also abundant in Bengal, and the other* 2 *being confined to the Peninsula),* 3 *Ceylon species, and about* 20 *species beyond our limits. Hopea has* 3 *Peninsula species (*1 *of which is as yet only known in fruit),* 2 *peculiar to Ceylon, and several in Birmah and other parts, all yielding valuable timber. Doona, a genus confined to Ceylon, about* 10 *species, some valuable timber. Vateria (the white dammer tree)* 2 *species, one of which inhabits the Peninsula and the other Ceylon. Stemonoporus, a Ceylon genus of Dr. Thwaites's (placed by Benth. & Hook. under Vateria, and by DeCandolle under Vatica)* 15 *species, and Monoporandra, also a genus peculiar to Ceylon,* 3 *species. Almost all the trees are of gigantic growth, and most of them yield very valuable timber and some yield resin and others wood oil.*

DIPTEROCARPUS. Gærtn.

For Gen. Char. see letter press to plate of D. Indicus.

1. Dipterocarpus Indicus, *Bedd.*—For description, &c., see Plate xciv.

2. Dipterocarpus Zeylanicus, *Thw.*—An immense tree, leaves very large, ovate or oblong shortly acuminate glabrous, long petioled; gemmæ villous, racemes axillary solitary bifid near the base, 6-12 flowered, aggregated at the apex of the branches, lepidote as are the petioles and costa of the leaves, the urceolate tube of the calyx when in fruit 5 ribbed. *Thw. En. Pl. Zey. p.* 33.

Ceylon, very common up to 3,000 feet elevation, called Horà ; a gum-resin and wood oil is obtained from it and the other species ; the wood weighs about 50 lbs. the cubic foot when seasoned, it is not durable but is very useful for centering, dam piling, and large scaffolding, and such like temporary works.

3. Dipterocarpus hispidus, *Thw.*—A very large tree, leaves oblong shortly acuminate, subcordate up to 19 inches long by 9 inches broad below hispid ; tube of the calyx in fruit spherical or subpyriform 5 angled at the apex, lobes 6-7 inches long. *Thw. En. Pl. Zey. p.* 33.

Ceylon, in the Saffragram district at no great elevation called Boo-horà ; easily distinguished by its very large hispid leaves.

4. Dipterocarpus oblongifolius, *Thw.*—A very large tree, leaves oblong shortly acuminate rounded at the base glabrous above except the costa hispid below on the costa and veins, 5-7 inches long, $2\frac{1}{2}$-4 broad, racemes solitary simple 2-4 flowered, calyx scaly, 5 angled. *Thw. En. Pl. Zey. p.* 34.

Ceylon near Ratnapoora.

5. Dipterocarpus scabridus, *Thw.*—A very large tree, leaves linear oblong, shortly acuminate, slightly narrowed at the base, glabrous above, slightly scabrid beneath about 7 inches long by $2\frac{1}{2}$-broad. *Thw. En. Pl. Zey. p.* 34.

Ceylon near Ratnapoora.

6. Dipterocarpus glandulosus, *Thw.*—A very large tree, leaves ovate acuminate rounded at the base under surface furnished with glandular pubescence which is at first yellow, then red and finally black, 4-6 inches long by 2-$2\frac{1}{2}$ broad. *Thw. En. Pl. Zey. p.* 34.

Ceylon, Saffragram and Ambagamwa districts, at no great elevation called Doranà.

7. Dipterocarpus insignis, *Thw.*—A very large tree, leaves ovate acuminate, hirsute on the costa and veins beneath 4-$5\frac{1}{2}$ inches long by 2 $2\frac{1}{2}$ broad, petioles 7-9 lines long very hirsute, calyx smooth longitudinally 5 bordered, subsessile on the rachis of the raceme. *Thw. En. Pl. Zey. p.* 34.

Ceylon, Saffragram district.

This genus is well represented in Birmah and Eastern Bengal, and a considerable trade is carried on in the wood oil or liquid balsam which is drawn from the trunks of the different species, and which is much in use for painting ships, houses, &c. Dr. Roxburgh describes the process of extraction as follows:—"To procure the balsam a large notch is cut into the trunk of the tree near the earth (say about 30 inches from the ground), where a fire is kept up until the wood is charred, soon after which the liquid begins to ooze out ; a small gutter is cut in the wood to conduct the liquid into a vessel placed to receive it. The average produce of the best trees during the season is said to be sometimes 40 gallons ; it is found necessary every 3 or 4 weeks to cut off the old charred surfaces and burn it afresh ; in large healthy trees abounding in balsam they even cut a notch in some other part of the tree and char it as the first ; these operations are performed during the months of November, December, January, and February ; should any of the trees appear sickly the following season one or more years respite is given."

VATICA. Linn.

For Gen. Char. see letter press to plate of Vatica Roxburghiana, No. xcv.

1. Vatica Roxburghiana, *Wight.*—For description, &c., see Plate xcv.

2. Vatica affinis, *Thw.*—A very large tree, leaves oblongo-lanceolate acuminate glabrous on both sides a little rounded at the base petiolate, primary veins 5-7 on each side, panicles axillary and terminal shorter than the leaves furnished with pale fulvous scales, anthers plane obtuse, connective produced into a short point, fruit 3 sulcate depressed at the apex. *Thw. En. Pl. Zey. p.* 404.

Ceylon in the Hinidoon Pattoo and Pasdoon Corle.

3. Vatica ? cordifolia, *Thw.*—A very large tree, glabrous, branches terete leaves shining oblongo-or ovato lanceolate acuminate obscurely and minutely reticulato-venulose, rotundato-cordate at the base 5-7 inches long by 2-3½ inches broad, petioles 1 inch long, primary veins about 7 on each side furnished with glands at the axils. *Thw. En. Pl. Zey. p.* 404.

A Dipterocarp found at Atakalan Corle in Ceylon and referred by Dr. Thwaites to this genus, but the inflorescence and fruit are unknown.

SHOREA. Roxb.

For Gen. Char. see letter press to plate of Shorea robusta, Plate iv.

1. Shorea robusta, *Roxb.*—A gigantic tree, leaves cordato-oblong 6-10 inches long by 4-6 broad, perfectly glabrous with the primary veins very prominent beneath, petioles ½-¾ inch long, stipules falcate, panicles many flowered terminal and axillary covered as are the calyx and corol on the outside with short dense white woolly tomentum, petals much attenuated towards the apex 12-13 nerved, stamens very numerous, filaments very broad and dilated below, apiculate below the anther, anthers bearded connective produced into a point with a bearded apex, style thick attenuated upwards puberulous 3 denticulate at the apex, calyx in fruit furnished with minutely stellate-pubescent or glabrescent wings about 2 inches long rounded at the apex about 10 nerved.

For further account of the tree see Plate iv

Shorea Tumbagaia, *Roxb.*—A gigantic tree, young branches petioles and panicles and under surface of the leaves hoary with minute stellate scale-like tomentum, pedicels calyx and outside of petals very white with soft hairy tomentum, leaves ovate with a short very blunt point, rounded or slightly cordate or retuse at the base 2½ to 8 inches long by 1½-4½ broad, primary veins very prominent beneath, petioles 1-2 inches long, panicles axillary and terminal many flowered, flowers fragrant secund, more than ½ an inch in length, petals attenuated upwards, glabrous and yellow inside, anthers very numerous 33-55, filaments broad and dilated below and more or less united together at the base, apiculate below the anthers, connective terminating in a single hairy bristle, style thick slightly attenuated upwards 3 denticulate at the apex, fruit furnished with dense silky pubescence towards the apex, wings of the fruit bearing calyx very unequal, 3 being much longer than the other two, all more or less pubescent and strongly 8-10 nerved.

For further account see letter press to Plate No. V.—*The figure there given is reproduced from Dr. Wight's Icones, and is a very faithful representation, but I have been induced to give a fuller description, as DeCondolle in the 16th part of his Prodromous makes two species out of this tree, assigning the name of penicillata to Wight's plant, and Tumbagaia to Roxburgh's, and giving 35 anthers to the former and 100 to the latter. I have very carefully explored all the Cuddapah and North Arcot mountains which go by the name of Balaghat, and this is the only species of Sal found there besides laccifera, and as it is universally known by the name of Thumba, there can be no doubt, I think, that it is Roxburgh's plant, and that his describing it as having 100 anthers is a mistake or a misprint; the anthers are very small, and could not be counted except under the microscope, but I never find much over 50; but about that number are constantly present. I have not met with the tree anywhere on the western side of the Presidency; the flowers are much larger, and the leaves differently shaped to those of S. oblongifolia, a Ceylon tree.*

3. Shorea laccifera, *WA.*—A large tree, young branches, under side of the leaves, stipules, and outside of the petals minutely hairy; leaves from ovate with a blunt acumination and small mucro, to exactly oblong, 2-7 inches long by 1½-3 broad, coriaceous glabrous above, primary veins prominent beneath, stipules rather large linear falcate very soon caducous, panicles numerous from the axils of the fallen leaves and about equalling the leaves in length, flowers ½-¾ inch long, calyx glabrous or subglabrous, lobes ovate acute, stamens 15, filaments slightly adherent to the base of the corol, gradually attenuated towards the apex, anther bristle very long not bearded. Style filiform rather deeply and prominently 3-cleft at the apex, wings of the fruit bearing calyx unequal 3 being ⅔rds longer than the other two, the longer wings rounded at the apex, the shorter ones subacute, prominently 7-9 nerved pubescent or subglabrous.—Shorea Talura, *Roxb. Fl. Ind.* ii. *p.* 618.

Vide Plate No. VI.—*The drawing is reproduced from Dr. Wight's Icones, and is very correct except the apex of the style, which should be prominently 3-cleft, and the stamens, which should be 15 instead of 12.*

4. Shorea oblongifolia, *Thw.*—A very large tree, leaves linear-oblong abruptly acuminate, truncato-rotundate or cordate at the base coriaceous glabrous on both sides except the costa above, 4-7 inches long by 1¾-2½ broad, petioles 6-8 lines long, young branches petioles and panicles minutely stellato-hoary, panicles supra-axillary, shorter than the leaves, flowers fragrant 4 lines long secund, pedicels very short, petals yellow strigose on the outside, stamens very numerous 80-100, connective produced into a very long glabrous awn, fruit bearing calyx produced into 5 wings 2 of which are small or obsolete, the other three are about 2½ inches long and gradually broader upwards and rounded at the apex, all minutely tomentose and much more open than in Shorea Tambagaia, fruit tomentosely hoary. *Thw. En. Pl. Zey. p.* 36.

Ceylon, south of the island, at no great elevation, allied to, but quite distinct from S. Tambagaia; this tree will probably yield a very valuable timber.

5. Shorea lissophylla, *Thw.*—A large tree, glabrous, leaves ovate or ovato-rotundate abruptly and shortly rostrate, rounded or subcordate at the base, primary veins about 7 on each side prominent on the underside, veinlets inconspicuous, 3-5 inches

long by $\frac{1}{2}$-3 inches broad, petioles $\frac{1}{2}$ an inch long rugulose, panicles glabrous many flowered, pedicels very short and with the flower buds minutely pubescently-hoary, anthers bearded. *Thw. En. Pl. Zey. p.* 402.

Ceylon, in the Singhe Rajah forest and Hinidoon Pattoo at no great elevation.

6. SHOREA ? STIPULARIS, *Thw.*—Is a Ceylon tree, with large persistent stipules, which Dr. Thwaites refers with doubt to this genus, as he has not seen the inflorescence ; it is found between Galle and Ratnapoora.

HOPEA.

For Gen. Char. see letter press to plate of Hopea parviflora, Pl. vi.

1. HOPEA PARVIFLORA, *Bedd.*—For description, &c., see Pl. vi.

This species is nearly allied to H. odorata, Roxb., and perhaps not specifically distinct ; young branches and petioles sparingly and panicles and calyx densely tomentoso-hoary, leaves elliptic with a short blunt point ovate, or narrow oblongo elliptic glabrous above, and glabrous or subglabrous beneath, often furnished with large prominent glands along the costa at the axils of the primary veins, panicles as long or a little longer than the leaves, 2 enlarged wings of the fruit bearing calyx light straw-colored 7-9 nerved, fruit glabrous shining and viscid.

I have specimens of this tree from all parts of the western forests, South Canara, Coorg, Wynad, Nilgiris, Anamallays, Madura and Tinnevelly; they differ slightly, but all agree in their hoary panicles of very small flowers ; my specimens from S. Tinnevelly, where the tree is called Nir kong, have longer and narrower leaves (5-7 inches long by 1-1$\frac{1}{2}$ broad) than the S. Canara specimens, and both the Anamallay and Tinnevelly specimens have rather larger flowers and the pubescence of the panicles not so dense.

2. HOPEA WIGHTIANA, *Wall.*—For description, &c., see Plate xcvi.

3. HOPEA, *Sp.*—A very large tree, every where glabrous, bark dark colored peeling off and hanging in long shreds on the trunk, leaves elliptic, very narrow at the base with a very long terminal point, 4-5 inches long by 2 inches broad, primary veins distant, only 4 on each side very prominent and 1 or more of them generally furnished with very large glands in the axils, petioles $\frac{1}{2}$-$\frac{3}{4}$ inch long, panicles axillary about the length of the leaves, the 2 enlarged wings of the fruit bearing calyx 3-3$\frac{1}{4}$ inches long by 13-15 lines broad.

This is a very distinct new species which I have only observed on the Wynad slopes and have not yet procured in flower; it is particularly abundant on the Carcoor ghat, where its curious trunks are very prominent ; the timber is very hard, heavy, and durable, and very valuable for engineering purposes ; it is of a deep reddish color and very different in appearance to that of the other 2 species.

4. HOPEA DISCOLOR, *Thw.* ; and 5. HOPEA JUCUNDA, *Thw.* ; are Ceylon trees described by Dr. Thwaites in his *En. Pl. Zey.* : they would be certain to yield valuable timber.

DOONA. THW.

For Gen. Char see letter press to plate of Doona Zeylanica, Plate xcvii.

1. DOONA ZEYLANICA, *Thw.*—For description, &c., see Plate xcvii.

2. DOONA GARDNERI, *Thw.*—For description, &c., see Plate xcviii.

3. DOONA AFFINIS, *Thw.* ; 4. D. NERVOSA, *Thw.* ; 5. D. TRAPEZIFOLIA, *Thw.* ; 6. D. CONGESTIFLORA, *Thw.* ; 7. D. CORDIFOLIA, *Thw.* ; 8. D. MACROPHYLLA, *Thw.* ; 9 D. OVALIFOLIA, *Thw.* ; 10. D. VENULOSA, *Thw.* ; are lofty timber trees growing in the forests of Ceylon, and are all described in Dr. Thwaites's *Enumeration Pl. Zeyl.* ; the ripe seeds of D. cordifolia are roasted and eaten by the Cinghalese.

VATERIA. L.

For Gen. Char. see letter press to plate of V. Malabarica, Pl. lxxxiv.

1. VATERIA MALABARICA.—For description, &c., see Pl. lxxxiv.

2. VATERIA INDICA, *L.*—A lofty tree, found only in Ceylon, where it is called Hal ; very similar to the Indian species, but differing in its much larger leaves and larger fruit, and in its anthers being auricled at the base and terminating in 2 bristles ; it yields a gum resin which is burnt by the natives at their ceremonies.

STEMONOPORUS. THW.

For Gen. Char. see letter press to plate of S. Gardneri, Pl. xcix.

1. STEMONOPORUS GARDNERI, *Thw.*—For description &c., see Pl. xcix.

2. STEMONOPORUS ACUMINATUS, *Thw.*—For description, &c. see Pl. c.

3. STEMONOPORUS WIGHTII, 4. S. AFFINIS, *Thw.* ; 5. S. LANCEOLATUS, *Thw.* ; 6. S. CANALICULATUS, *Thw.* ; 7. S. PETIOLARIS, *Thw.* ; 8. S. RIGIDUS, 9. S. OBLONGIFOLIUS, 10. S. RETICULATUS, *Thw.* ; 11. S. NITIDUS, *Thw.* ; 12. S. ? MOONII, 13. S. DISTICHUS, *Thw.* ; 14. S. SCABRIUSCULUS are all trees found in the forests of Ceylon, and are all described in Dr. Thwaites' *Enumeration Pl. Zey.* No. 5 is a small tree, and Nos. 6, 7, 10 and 11 middling sized trees, and the others very large trees.

MONOPORANDRA. THW.

For Gen. Char. see letter press to plate of Monoporandra cordifolia, Pl. ci.

1. MONOPORANDRA CORDIFOLIA, *Thw.*—For description, &c., see Pl. ci.

2. MONOPORANDRA ELEGANS, *Thw.* ; 3. M. LANCIFOLIA, *Thw.* ; are small or middling sized trees found in Ceylon, and are described by Dr. Thwaites in his *En. Pl. Zey.*

ORDER XV.—MALVACEÆ.

Flowers regular, usually hermathrodite or rarely partially dicœcious or polygamous, sepals 5 rarely 3-4 more or less united in a lobed or entire calyx, the lobes valvate, petals 5 hypogynous usually adnate at the base to the staminal column contorted in the bud, rarely wanting ; stamens indefinite or subdefinite, hypogynous more or less united at the base, the column divided into filaments at the top or bearing the filaments outside below or up to the top, anthers from globose to linear often reniform or variously waved 1 celled or spuriously divided into 2 cells by a thin and incomplete longitudinal septum. Torus small or conical and protruding into the centre of the ovary, not expanded into a disk, ovary 2 or more celled, (very rarely reduced to a single carpel) entire or lobed, the carpels verticellate round the axis or irregularly clustered. Style simple at the base, divided at the top into as many or twice as many branches or stigmas as there are cells, or rarely entire and clavate ; ovules 1 or more in each cell ascending or horizontal with a ventral or superior raphe or reversed and pendulous with the raphe dorsal, fruit dry or rarely baccate, the carpels separating and indehiscent or two valved or united in a loculicidally dehiscent capsule. Seed with the testa usually crustaceous, without or with very little albumen, cotyledons usually folded and often enclosing the curved or rarely straight radicle. Trees, shrubs (or herbs,) hairs usually stellate, leaves alternate mostly toothed lobed or divided with palmate nerves or divisions rarely digitately compound ; stipules free usually subulate or small and deciduous rarely leafy ; peduncles usually 1-flowered and articulate above the middle rarely bearing a bract at the joint or several flowered, all axillary or the upper ones forming a terminal raceme or panicle, bracteoles either none or 3 or more free or united forming an involucre (epicalyx) close to or adherent to the calyx, flowers often large.

Tribe I. Malveœ.—Staminal column bearing filaments to the summit, style-branches the same number as the ovary cells ; mature carpels separating more or less from the axis.

Kydia.

Tribe II. Hibisceœ.—Staminal column truncate or five toothed at the summit, bearing the anthers or filaments on the outside or rarely at the summit also ; style-branches or stigmas the same number as ovary-cells, carpels united in a several-celled capsule, loculicidal or indehiscent.

Julostyles, Dicellostyles, Hibiscus, Thespesia.

Tribe III. Bombaceœ.—Staminal column divided at the top into numerous filaments (or the filaments or anthers variously arranged) style undivided or with very short stigmatic lobes as many as ovary-cells, carpels united in a loculicidal or indehiscent capsule.

Adansonia, Bombax, Eriodendron, Cullenia.

Malvaceœ (or Mallow-worts) are distinguished from Sterculiaceœ and Tiliaceœ by their one celled anthers, and from all others by their valvate calyx and monadelphous hypogynous stamens. It is not an order of any importance to the forester, as it yields no valuable timber. Kydia and Thespesia are small trees, the timbers of which are sometimes used, and the latter (commonly known as the tulip tree) is largely planted as an avenue tree. Cullenia (a tree in foliage exactly like the Dorian of the Straits, which also belongs to this order) is one of the largest trees in our western forests, but its timber is very soft and worthless. Bombax (the red flowering cotton tree) also ranks with our largest trees, but its timber is useless. One species of Eriodendron and one of Hibiscus are small trees of no value. Julostyles and Dicellostyles are middling sized trees peculiar to Ceylon, and Adansonia, a tree of no great height, but with a trunk of immense bulk, is an introduction from Africa, and only met with in a planted state. To this order belong numerous herbaceous plants, such as Sida, Abutilon, Urena, Pavonia and Hibiscus ; but these require no notice in this work. The true cotton plant (Gossypium) also belongs to this family.

KYDIA. Roxb.

Gen. Char. : Flowers subdicœcious, epicalyx of 4-6 patent foliaceous bracteoles, calyx campanulate 5 fid, petals 5 longer than the calyx attached by their claws to the base of the staminal column. Staminal column divided into 5 branches at the apex each bearing 3-8 sessile anthers, the branches being abbreviated and the anthers sterile ; in the female flowers, ovary 2-3 cellled, ovules 2 erect, style 1, with 3 branches, stigmas large peltate dilated, in the male flowers, ovary abortive style abbreviated, capsule depresso globose 3 valved loculicidally dehiscing, seed ascending reniform.

Trees. Stellato-tomentose leaves palminerved, lobed or entire, flowers panicled.

Kydia calycina, *Roxb.*—A middling sized tree polygamous bark ash colored, head large spreading, young shoots, leaves, petioles, panicles, inflorescence, and capsules covered with a stellate pubescence and brown mealy dust, leaves broad cordate generally 3-5 angled irregularly dentate 5-7 palminerved, 1-3 of the nerves beneath often furnished with a large hollow gland about the centre 3-6 inches each way, petioles 2-3 inches long, panicles axillary and terminal, leafy, flowers whitish or pink numerous, collected in small bracteated umbellets at the apex of the branchlets, epicalyx 4-6 leaved, generally 4-5 leaved in the female, longer than the calyx, 6 in the male shorter than the calyx, petals emarginate ciliate, anthers 4 to each filament, capsule small slightly 3 lobed size of a large pea, hid in the calyx, seed brown obtusely 3 sided. Kydia calycina et fraterna, *Roxb. Fl. Ind.* iii. *p.* 188-90 ;—*Wight Ill. tab.* 879, 880. Kydia Roxburghiana, *Wight Ill. tab.* 881.

A common tree on both sides of the Presidency, and up to 5,500 feet ; it differs much in the amount of pubescence and in the inflorescence. I cannot distinguish Wight's Roxburghiana, of which I have specimens ; and a variety found in the Anamallays has shorter, few flowered panicles with the flowers larger, but does not otherwise differ. The wood is whitish straight grained, and slightly elastic, and is used for building and various other purposes, and the bark yields a good fibre ; the tree is called Pandikee in Teligu and Bendi in Mysore (Canarese), Kopasia in Ganjam districts (Oorea), and Warung on the Bombay ghats.

Analysis of Genera, Pl. III.

Dissections of ♀ and ♂ flowers of Kydia calycina, fig. 5.

JULOSTYLES. Thw.

Gen. Char. : Bracteoles of the epicalyx 4 broad subconnate, calyx short 5 fid, petals 5 joined at the base, staminal column cylindrical 5 toothed at the apex, adnate to the corol at the base, bearing 10 filaments, anthers reniform, ovary 2 celled, cells 2 ovuled,

ovules collateral ascending, style 2 branched, stigmas large peltate glabrous, capsule globose stellato-hispid. A tree, leaves lanceolate or ovato-lanceolate entire, 3 nerved at the base, panicles terminal. *Thw. En. Pl. Zey. p.* 30.

JULOSTYLES ANGUSTIFOLIA, *Thw.*—A middling sized tree, sparingly ramous, leaves 5-8 inches long by 1½-3 inch broad, stellately pubescent, paler beneath, petioles 3-5 lines long, panicles terminal pendulous, flowers ½ an inch broad whitish-red in the centre, branchlets of the style densely hairy. *Thw. En. Pl. Zey. p.* 30. Kydia angustifolia, *Arnt.*

Ceylon, south of the island—common. An ornamental tree.

Anaalysis of Genera, Pl. III.

Dissections of the flower of Julostyles angustifolia, fig. 4.

DICELLOSTYLES. BENTH.

Gen. Char.: Bracteoles of the epicalyx 4-6 lanceolate subconnate at the base much longer than the calyx, calyx broadly 5-fid, staminal column short bearing numerous filaments at and below the apex, ovary 2 celled, cells 2 ovuled, ovules collateral ascending, style 2 branched, branches unequal, stigmas large globose hairy, capsule globose stellato-hispid 8 ribbed, separating into 2 indehiscent cocci, seed solitary by abortion, reniform ascending, albumen fleshy, cotyledons biplicate, radicle short incurved. Trees, slightly stellato-tomentose or glabrescent, leaves entire or obsoletely toothed or shortly 3-5 lobed, pedicels axillary 1 flowered.

DICELLOSTYLES AXILLARIS, *Thw.*—A middling sized tree, leaves ovato-lanceolate glabrescent paler beneath rounded at the base 2½-4½ inches long by 1¼-2 broad, petiole 2-4 inches long ; epicalyx with its bracteoles 1¼-1½ inches long 3-6 lines broad, calyx very hairy on the inside, petals 1 inch long oblong subspathulate a little oblique yellowish red, and red towards the base. *Thw. En. Pl. Zey. p.* 401. Kydia axillaris, *Thw. l. c. p.* 30.

Ceylon, near Badulla, 2,000 feet elevation—an ornamental tree.

Analysis of Genera, Pl. III.

Dissections of a flower, &c. of D. axillaris, fig. 6.

HIBISCUS. LINN.

Gen. Char.: Epicalyx of 5 or more distinct or more or less connate bracteoles, calyx 5-lobed or toothed, staminal column truncate or 5 toothed at the summit, ovary 5 celled with 3 or more ovules in each cell, style simple below, dividing above into 5 branches each terminated by a capitate stigma, capsule coriaceous loculicidally 5 valved, sometimes (in H. tiliaceus) with false dissepiments, seeds reniform angular or subglobose glabrous downy or woolly. (Herbs) shrubs or small trees, leaves polymorphous, flowers generally large and showy.

This genus is represented by numerous herbs or under shrubs, but the following is the only species worth recording in this work.

HIBISCUS TILIACEUS, *Linn.*—A small tree with purplish branches marked with the annular scars made by the deciduous stipules, leaves on long stalks, coriaceous, cordate orbicular or broadly ovate acuminate, (rarely 3-5 lobed) entire or sinuous 5-7 nerved smooth on the upper, hoary on the lower surface, 3-5 inches in diameter, stalks shorter than the blades, vernation conduplicate, stipules large foliaceous oblong-ovate deciduous, peduncles somewhat woody axillary angular jointed, epicalyx cup-shaped divided about ½ down in 10-14 triangular entire teeth much shorter than the calyx, calyx nearly an inch long broadly campanulate 5-parted, segments lanceolate with a prominent downy nerve, corol 2-3 times the size of the calyx yellow with a purple spot at the base, capsule exceeding the persistent calyx oblong pentagonal downy 5 valved, valves adhering to the dissepiments, their margins papery, corrugated and turned inwards, so as to render the capsule spuriously 10-celled, seeds slightly pilose. *DC. Prod.* 1. 454 ;—*Oliv. Fl. of Trop. Af. p.* 207. Paritium tiliaceum, *St. Hill.* ;—*Wight. Ill. tab.* 7.

A small tree common about banks of rivers on the western coast and in Ceylon, and widely distributed in other countries ; the flowers are yellow in the morning and become red in the evening ; ropes, cords, and fine mats are made from the fibre of the bark ; the tree abounds with mucilage and in the West Indies the bark is sucked in times of famine ; the timber is soft and valueless.

Analysis of Genera, Pl. IV.

Flower and fruit of Hibiscus tiliaceus, fig. 1.

THESPESIA. CAV.

For. Gen. Char. see letter press to Pl. lxiii.

THESPESIA POPULNEA, *Cav.*—For descriptions, &c., see Pl. No. lxiii.

ADANSONIA. LINN.

Epicalyx none, calyx leathery cup shaped, petals 5, staminal column dividing above into a great number of filaments, anthers reniform, ovary 5-10 celled, cells many ovuled, style longer than the stamens dividing above into as many stigmatic rays as there are cells to the ovary, fruit oblong woody indehiscent filled with pulp ; seeds reniform, embryo curved, cotyledons much twisted. Trees, with a comparatively low trunk of vast circumference. leaves digitate, flowers white axillary stalked pendulous.

ADANSONIA DIGITATA, *L.*—A tree of moderate height, but with a trunk of immense thickness, smaller branches somewhat angular downy, leaves stalked digitate, stalks 4-5 inches long, leaflets oblong entire or sinuous at the margins, acuminate, smooth above

downy below, 2-3 inches long, peduncles solitary axillary 1 flowered twice the length of the leaves pendant, calyx cup-shaped 5 cleft, lobes oblong obtuse leathery velvetty inside, petals 5 roundish leathery white spreading alternately reflected, twice or thrice the size of the calyx, 5-6 inches in diameter, column of stamens entire below, above broken up into a great number of filaments bearing 1 celled anthers, style long, stigma of 7-10 spreading rays, ovary ovate silky, flowers in May before the leaves. *Oliv. in Fl. Trop. Africa p.* 212.

This is a famous Baobab or Monkey-bread-tree, a native of upper Guinea, but found in a cultivated state in many parts of this Presidency ; the timber is pale colored, light, soft and useless ; the bark furnishes a cordage ; all parts of the tree abound with a thick mucilaginous juice, which is drawn in Africa, and used in various ways ; and the young leaves pounded are used as a condiment. The fruit, which resembles a citron in shape, is filled with reddish spongy pulp of a sweetish acid taste, of which agreeable and refreshing acidulous drinks are prepared and employed as a cooling beverage in fevers.

BOMBAX. L.

For Gen. Char. see letter press to Pl. lxxxii.

Bombax Malabaricum, *DC.*—For description, &c., see Plate No. lxxxii.

ERIODENDRON. *DC.*

Epicalyx none, calyx cup-shaped 5 toothed, staminal column divided at the apex into 5 divisions each bearing 3 sinuous anthers, ovary 5 celled, ovules numerous, style club shaped pentagonal, capsule coriaceous downy within. Seeds obovoid embedded in wool. Spiny tree with digitate leaves and large axillary terminal rose-coloured or white flowers.

Eriodendron anfractuosum, *DC.*—A large tree, spiny when young, trunk dilated at the base, branches verticellate, leafstalks 4-6 inches long terminating in a small suborbicular disk, from which proceed in a digitate manner 7 shortly stalked lanceolate acuminate undulate leaflets smooth on both surfaces, 4-6 inches long 1-1½ inches broad, calyx ¾ inch long leathery cup shaped with 5 shallow rounded lobes, corol 3 or 4 times the length of the calyx ; petals oblong obtuse white or rose coloured villous outside glabrous within, stamens united into 5 bundles each bearing 3 sinuous anthers, capsule ovate oblong 5-8 inches long, 5 valved, many seeded, seeds woolly. *Oliver Fl. Africa p.* 214. Bombax pentandrum, *Linn. p.* 959 ;—*Roxb. Fl. Ind.* iii. *p.* 165.

A common tree, much planted about villages and temples ; it is known as the white-flowering cotton tree, and called Sufaid Simal in Hindustani ; its timber is soft and useless.

Analysis of Genera, Pl. IV.

Dissections of the flower of Eriodendron anfractuosum, fig. 2.

CULLENIA. Wight.

Gen. Char. :—Epicalyx tubulose slightly 3 toothed deciduous, calyx tubular 5 toothed, petals none, staminal column 5 cleft above, anthers small subglobose forming numerous capituli on the branches of the column, ovary 5 celled, ovules 2 in each cell superposed, style elongate stigmatose at the apex, fruit globose densely muricated at length 5 valved, seed furnished with a fleshy aril, cotyledons unequal thick fleshy.

A very lofty tree, leaves silvery beneath with dense white scales, flowers subsessile congested in compact clusters on the naked branches. *Wight Ic. tab.* 1761 *and* 1762.

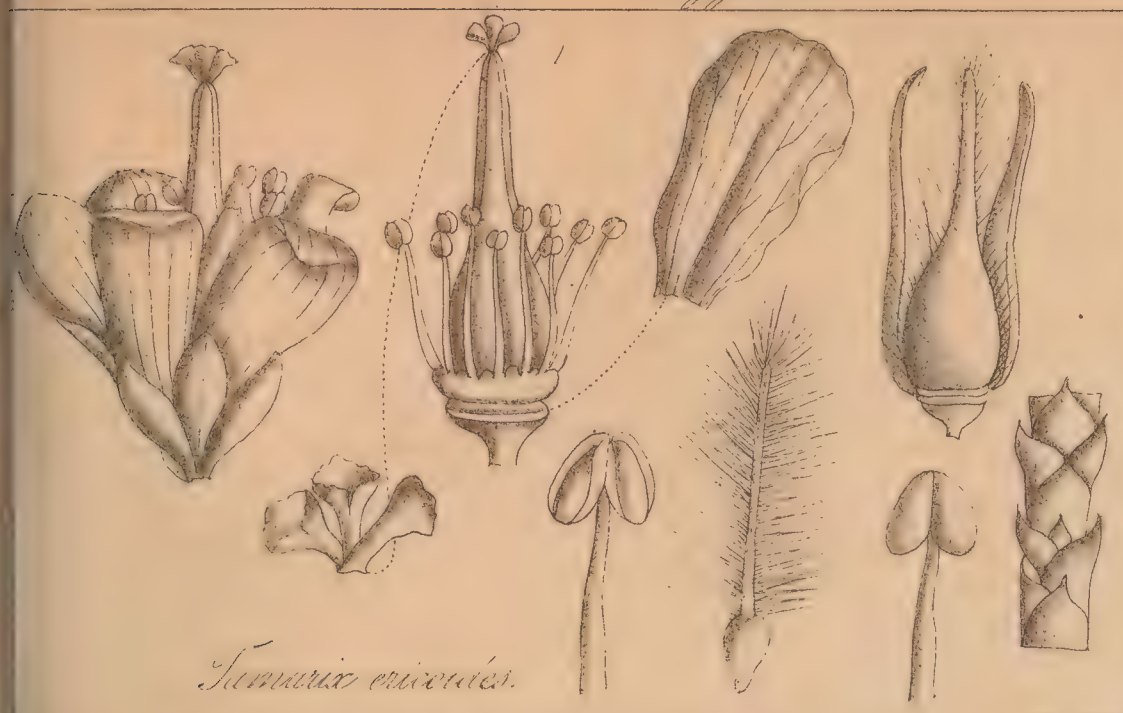
Cullenia excelsa, *Wight.*—A gigantic tree, bark brownish rather smooth, branches spreading, leaves elliptic oblong with a short blunt acumen, bright shining green above, silvery beneath from numerous adpressed scales (like Elœagnus), flowers congested in compact clusters on the naked branches, short pedicelled, pedicels jointed at the base, epicalyx and calyx thickly clothed with adpressed brown scales, fruit about the size of a large orange beset on all sides with hardish prickles, testa of the seed pale chestnut. *Wight l. c.* Durio Ceylanica, *Gardn. in Calc. Journ. of Nat. His. vol.* viii.

This is one of the largest trees in our western mountains, up to 4000 feet, and is very common on the Anamallays, western slopes of the Nilgiris, Wynad, Coorg, Travancore, &c, and in Ceylon. The wood is beautifully white but very soft and worthless ; the tree is often called Ainee pillaò, but that name is also given to the Artocarpus hirsutus. In Ceylon it is called Kattoo-bodde and Kattooherileya.

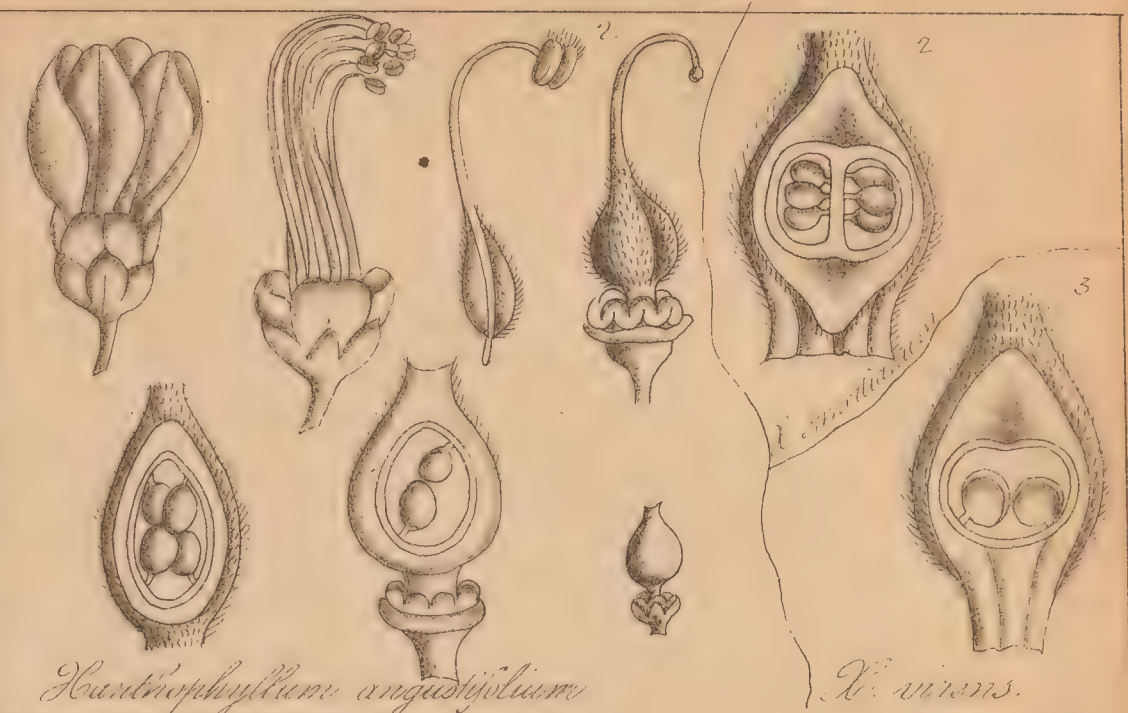
Analysis of Genera, Pl. IV.

Dissections of the flower, &c. of Cullenia excelsa, fig. 3.

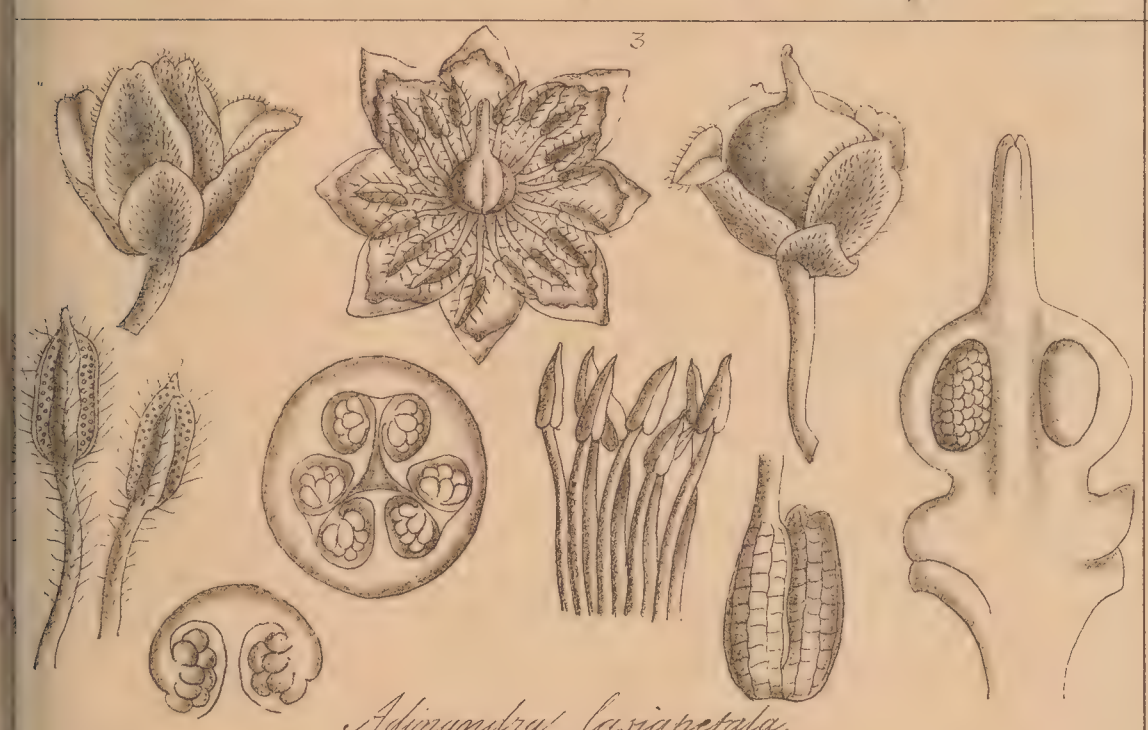
Tamariscineæ. Polygaleæ. Ternstramiaceæ. Malvaceæ.



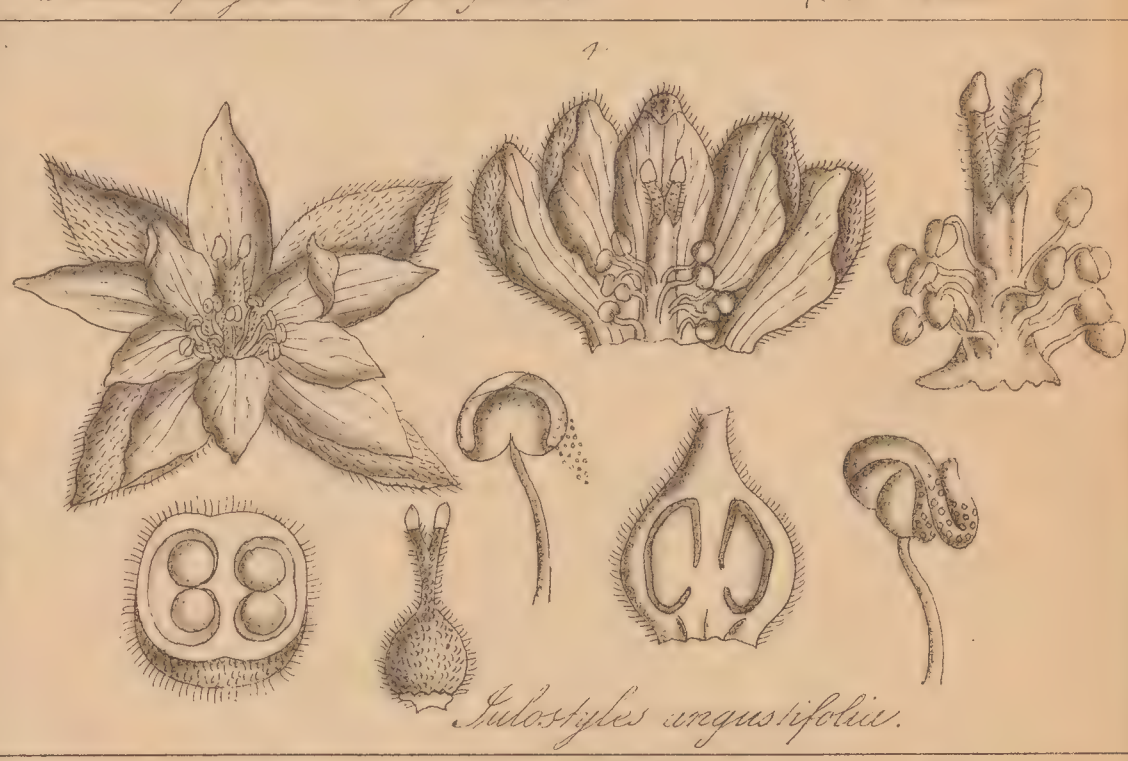
Tamarix ericoides.



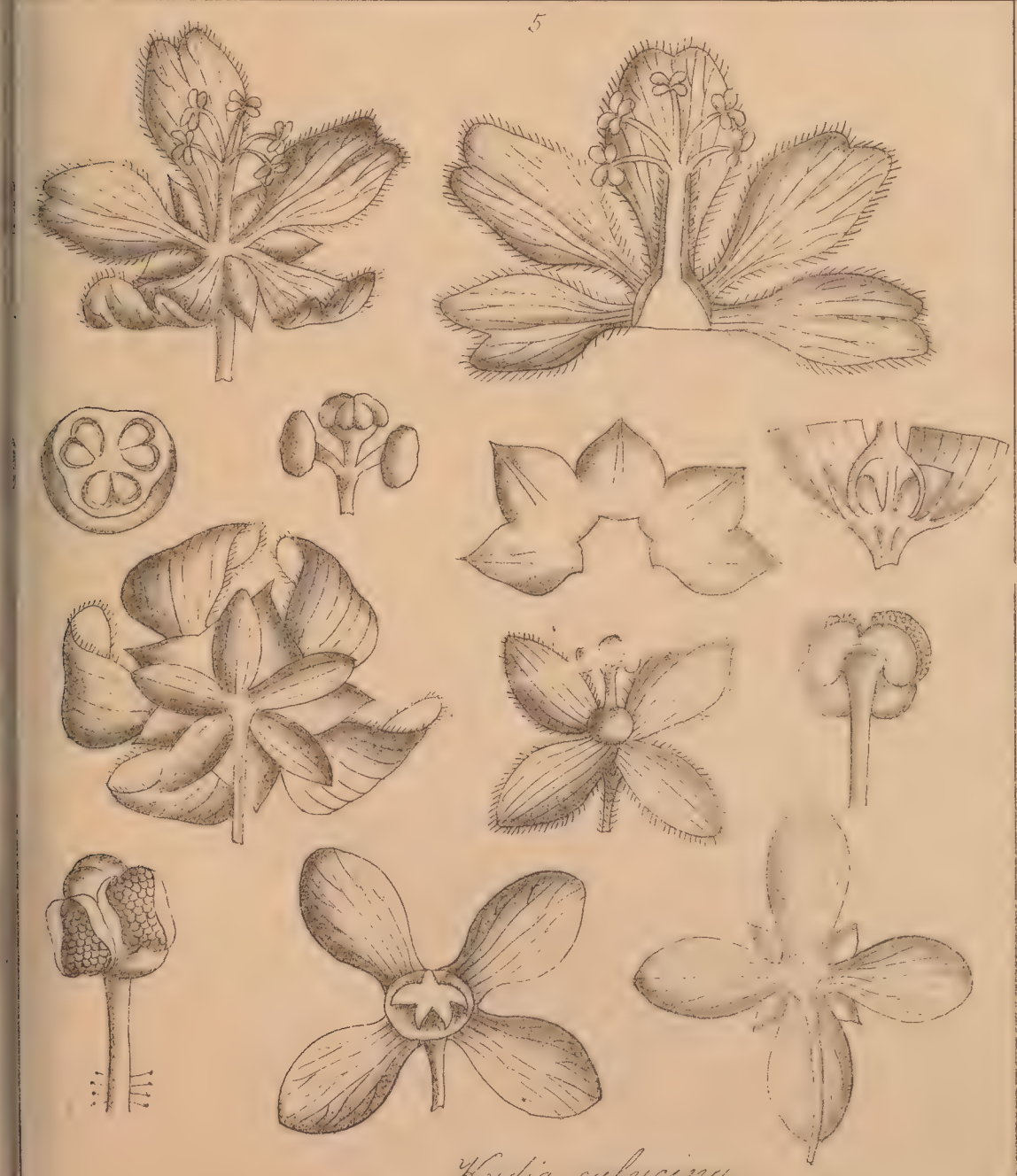
Hermannophyllum angustifolium. H. virens.



Adinandra Cassiopetala.



Eulostyles angustifolia.



Kydia calycina.

Dicellostyles axillaris.

Govindoo; del. Dumphy, Lith.

ORDER XVI.—STERCULIACEÆ.

Flowers regular, hermaphrodite or unisexual. Calyx usually persistent, more or less deeply divided into 5 or rarely 4 or 3 valvate lobes or segments, or rarely splitting irregularly, or the sepals entirely free. Petals either 5, hypogynous, free, or adhering to the staminal column, contorted-imbricate in the bud, or small and scale-like, or none. Stamens usually united into a ring, a cup, or tube, with 5 terminal teeth or lobes (staminodia) alternating with the petals, and one or more anthers sessile or stipitate (on distinct filaments) in each interval, the anthers 2-celled and opening outwards, in longitudinal slits, or exceptionally the anthers are numerous or the staminodia wanting, or the stamens 5, free and alternate with the sepals or the anther-cells confluent or opening in terminal pores. Ovary free, 2 to 5-celled, with the carpels more or less united, rarely 10 or 12-celled, or reduced to a single carpel. Ovules 2-many in each cell, rarely solitary, affixed to the interior angle ascending or horizontal anatropal or amphitropal, raphe ventral or lateral micropyle inferior or rarely orthotropal. Style entire or divided into as many branches as there are cells, or rarely styles as many, nearly or quite free. Fruit various. Seeds sometimes hairy but not woolly, sometimes enveloped in pulp or strophiolate, the testa coriaceous, occasionally enclosed in an outer membranous integument, albumen fleshy or none ; cotyledons usually foliaceous, flat or folded, the radicle shorter, next the hilum or rarely distant from it. Herbs, shrubs, or trees. the tomentum or hairs stellate, rarely mixed with simple hairs. Leaves alternate or irregularly opposite, simple and pinnately or palmately nerved, entire toothed or lobed, or digitately compound. Stipules rarely wanting.

This order is represented in S. India by about 21 trees, viz., eight belonging to the genus Sterculia, one to Heritiera, one to Kleinhovia, seven to Pterospermum, two to Eriolœna, one to Abroma and one to Guazuma. The Guazuma, a naturalized tree from America, produces a good timber for furniture known as Bastard Cedar, and some of the Pterospermums yield good timber ; the Heritiera and the 2 Eriolœnas have very hard and tough wood, but the latter are very small. The Sterculias are some of them very ornamental trees for planting purposes, and the Sterculia villosa yields the Vakke nàr or valuable elephant rope fibre most useful to the forest officer in this country, and the Ster. guttata also yields a fibre scarcely inferior ; the Kleinhovia and Abroma are both very ornamental trees. The Cocoa (Theobroma) belongs to this order, and has been introduced into plantations on the western side of the Presidency, where it grows and fruits very well at an elevation of about 3,000 feet.

Tribe I, Sterculieœ.—Flowers unisexual or polygamous, calyx sometimes colored, petals 0, anthers 5-15 adnate crowded at the extremity of a long column or a short gynophore around the base of the ovary.

Anthers crowded into a head, seed albuminous	STERCULIA.
Anthers in a single row verticellate, albumen 0	HERITIERA.

Tribe II, Helictereœ.—Flowers hermathrodite, petals 5 deciduous, anthers 15, cells divergent alternating with small staminodia.

Anther cells divaricate, capsule membranaceous inflated	KLEINHOVIA.
Anther cells divaricate or confluent into one, fruit carpels spirally twisted	HELICTERES.
Anther cells parallel linear, fruit woody, seed winged	PTEROSPERMUM.

Tribe III, Eriolœneœ.—Flowers hermathrodite, petals deciduous, anthers numerous all fertile in many rows towards the apex of a conical tube or column ... ... ERIOLÆNA.

Tribe IV, Hermanieœ.—Flowers hermathrodite petals flat.

Stamens 5 distinct, staminodes 0, cotyledons entire	MELOCHIA.

Tribe V, Buettnerieœ.—Flowers hermathrodite, petals concave often with an appendage at the apex, anthers at the margins of a funnel shaped staminal tube between the staminodia.

Capsule membranaceous angled	ABROMA.
Capsule woody muricate	GUAZUMA.

STERCULIA. LINN.

For Gen. Char. see under letter press to plate of Sterculia guttata, Pl. cv.

1. STERCULIA GUTTATA.—For descr. see letter press to Pl. cv.

2. STERCULIA FŒTIDA, *Linn. ; DC. Prod.* i. 483.—A tall stout tree, glabrous, except the very young leaves. Leaves crowded at the ends of the thick branchlets, deciduous, digitately compound on long petioles ; leaflets 5 to 11, elliptical oblong or almost lanceolate, 4 to 8 inches long, mostly acuminate, entire, coriaceous, contracted into short petiolules. Flowers rather large, of a dull red, coming out with the young leaves in loose, simple or branched racemes, not exceeding the petioles. Calyx deeply divided into 5 lanceolate spreading segments, about ½ inch long, glabrous outside, tomentose inside. Staminal column or gynophore slender and curved, both in the males and females. Ovary very villous, 5-celled, with many ovules in each cell. Follicles large, woody, glabrous outside, fibrous within. Seeds 10 to 15, oblong, the radicle remote from the hilum. *R. Br. in Benn. Pl. Jav. Rar.* 227 ;—*Wight Ic. t.* 181 *and* 364.

A very handsome tree, well worthy of cultivation, found sparingly throughout the Presidency and in Mysore, Bombay, Bengal, Birmah and Ceylon ; it does not ascend the mountains, at least to any elevation ; it is called in Hindoostanee the Jungleebadam (or wild almond), the seeds being roasted and eaten like chesnuts. In Tamil it is called Peenaree, in Teligu Gurapu badam or horse almond, in Ceylon Telemboo, and in Birmah Letkohe ; a cubic foot of the wood unseasoned weighs 34 to 38 lbs., and when seasoned 28 lbs., and

its specific gravity is ·448. It is light, tough, and rather open grained, of a yellowish white color, easily worked, and not liable to split or warp ; it is used for housebuilding and in the construction of canoes, and is adapted for packing cases, &c. Every part of the tree has a disagreeable smell when bruised ; the leaves, bark, fruit and seeds are used medicinally by the natives.

3. Sterculia Balanghas, *Linn.*—A middling sized tree, bark brown pretty smooth, leaves alternate about the extremities of the branchlets elliptic-oblong nearly glabrous on both sides entire 2-12 inches long, petioles about 1 inch long, panicles axillary generally solitary pendulous, peduncles and pedicels colored slender a little downy, flowers numerous small pendulous flesh-colored slightly fragrant ; calyx campanulate hairy 5 parted, segments long slender, margins revolute converging at the points gaping wide at the sides ; male, column of stamens recurved towards the apex crowded with minute anthers ; hermathrodite, filaments numerous but very short, anthers fertile surrounding the base of the ovaries, ovaries 5 very hairy elevated on a receptacle surrounding a column which ends in a style, carpels (from 1 to 5 come to maturity) oval, seeds few affixed to the gaping sutures. *Roxb. Fl. Ind.* iii. *p.* 144. Cavalum, *Rheede. Mal.* ii. *t.* 49. Southwellia Balanghas, *Schott and Endl.*

I have only met with this tree in Travancore and in Ceylon, but it is also found in other parts of the western coast forests, and is often planted in gardens, &c. The seeds are roasted and eaten, and are nearly as palatable as chesnuts ; the wood is not used as far as I know, it is open grained and soft. Cavalum is the native name for the tree in Malabar.

4. Sterculia populifolia, *Roxb.*—A large tree, leaves roundish cordate, acuminated entire membranaceous glabrous, racemes axillary peduncled branched shorter than the leaves, calyx-segments linear elongated revolute obtuse, ovary stalked, ovules numerous in each cell, carpels ovate ventricose terminated by a very short cultriform wing, long stalked glabrous, villous within. *Roxb. Fl. Ind.* iii. 148 ;—*WA. Prod. p.* 62. Hildegardia populifolia, *Schott and End.*

A very handsome tree with scarlet flowers, found in the forests of the northern division of the Madras Presidency and in the Godavery forests, but I have not met with it on the western side of the Presidency. I am not acquainted with its timber.

5. Sterculia colorata, *Roxb.*—A very large tree with an erect trunk, bark ash colored and a little scabrous, leaves villous alternate about the extremities of the branchlets, 5 lobed 5 nerved, the lobes acute 6-9 inches long by 9-12 inches broad, petioles about 9 inches long, stipules erect lanceolate, panicles terminal small numerous covered, as are the calyx and carpels, with brilliant red stellate pubescence, flowers about 1 inch long, calyx tube clavate, leathery 5 toothed at the apex, filaments scarcely any, anthers about 30 sessile round the border of the apex of the column, styles 5 short recurved, stigmas acute, carpels (from 1 to 5 come to maturity) pedicelled pendulous leathery opening long before the seeds are ripe, seeds generally 2 about the size of a field bean. *Roxb. Fl. Ind.* iii. 146. Firmiana colorata, *Br.* Erythropsis Roxburghiana, *Lindl.*

Not uncommon in the forests of the plains and about the foot of mountains throughout this Presidency, and in Mysore, Bombay, Bengal and Ceylon ; it sheds its leaves in the cold weather, and is shortly afterwards covered with a mass of flowers, when it is a most beautiful object, appearing as if covered with numerous ramifications of red coral ; it is called Karakà in Telegoo, and Khowsey and Bhaikoee on the Bombay ghats. I am not acquainted with its timber.

6. Sterculia urens, *Roxb.*—A large tree with a trunk of considerable girth, bark with very smooth leaves about the extremities of the branches alternate round cordate 5 lobed 5 nerved, lobes entire long finely pointed, 9 to 12 inches each way, very velvetty on the underside, nearly glabrous above, petioles about as long as the leaves downy, panicles terminal pretty large covered with a glutinous farinaceous yellow down, bractes lanceolate, flowers small numerous yellow, male and hermathrodite mixed, but the former more numerous, calyx campanulate 5 toothed leathery, segments acute with a hairy gland on the inside at the base, filaments 10 alternately longer united below into a thin sheath which encircles the receptacle of the ovaries, anthers large 2 lobed alternately larger, ovaries 5 on a thick short pedicel, style single short thick, stigma 5 lobed, carpels 5 united in the form of a star, covered with dense patent rigid stinging hairs, seeds 3 to 6 oblong chesnut colored. *Roxb. Fl. Ind.* iii. *p.* 145. Cavallium urens, *Schott and Endl.*

This tree is very common throughout the peninsula and in Ceylon, and may be seen in every forest, but does not ascend the mountains to any elevation ; it is deciduous in the cold weather, and the flowers appear before the leaves ; the wood is white and very soft, but native guitars and toys are sometimes made from it, and it is used for fuel. The tree yields a gum resembling Tragacanth, but not as valuable, the seeds are roasted and eaten and said to be cathartic, and a kind of coffee is made from them. The tree is called Thabsee in Teligu and Vellay Pootalee in Tamil.

7. Sterculia villosa, *Roxb.*—A middling sized or small tree, bark smooth, leaves alternate very downy particularly beneath, roundish or cordate lobate, 5 nerved, lobes 5-7 long pointed and lobate, from 12 to 18 inches each way, petioles round downy as long or longer than the leaves, stipules lanceolate-cordate downy caducous, panicles terminal the longer pendulous, the shorter drooping, every part covered with rust colored down, flowers numerous male and hermathrodite mixed, the former most numerous, all pretty large of a pale straw color and pink at the base of the calyx inside, bractes filiform caducous, calyx campanulate outside downy ; hermathrodite, anthers 10 two lobed inserted on to the toothed edge of a membranaceous ring which surrounds the base of the ovaries, ovaries globular, style single, stigma 5 lobed, carpels 5 or fewer by abortion covered with rust colored down ; male, the anthers are placed round 5 glands which represent the female organs. *Roxb. Fl. Ind.* iii. *p.* 153.

This tree is found throughout the Madras Presidency, and also in Bengal and Bombay ; it is very common in the Anamallay forest, and is of great use to the Forest Department, as its bark yields a valuable fibre which is made into very strong ropes and used by the elephants to drag timber with ; bags are also made from it. The tree is called Vake nár or Anee nár in Tamil, which latter means elephant fibre. The timber is not of any value ; good paper has been made from the fibre.

8. Sterculia alata, *Roxb.*—A very large tree up to 100 feet high, trunk straight, up to 10 feet in girth, bark smooth ash colored, leaves alternate about the ends of the branchlets cordate entire smooth 3-5 nerved, 4-12 inches long by 3-8 broad, petioles round smooth 1-4 inches long, stipules minute subulate early caducous, racemes axillary or terminal about as long as the petioles, sub-

panicled, clothed with ferruginous stellate pubescence, flowers pretty large short pedicelled reflexed male and female on the same racemes, bractes ensiform 3 under each flower early caducous, calyx campanulate divided nearly to the base into 5 thick fleshy recurved lanceolate segments clothed with ferruginous stellate pubescence on the outside, inside striated with crimson and yellow ; male, staminal column cylindric straight much shorter than the calyx, anthers subsessile imbricated in 5 fascicles of about 5 each, which unite below the middle and form a cup round the 5 rudimentary ovaries ; female, column wanting, staminodia in 5 sessile bundles embracing the 5 grooves of the base of the ovaries, ovaries 5 each semi-ovate, styles short recurved villous, stigmas broad and emarginate, carpels very large, nearly round, 3-5 inches in diameter, long peduncled, seeds numerous oblong compressed each terminating in a long broad spongy wing which is thin and submembranaceous at the apex, *Roxb. Fl. Ind.* iii. 152. Pterygota alata, *Br.* Pterygota Roxburghii, *Schott et Endl.*

A very handsome ramous tree, deciduous in February and March when it flowers ; it is found on the Cuttack mountains and in Eastern Bengal and Ceylon, but I have never seen it in the southern part of this Presidency ; in Sylhet it is called Toola, and the seeds are said to be eaten as a cheap substitute for opium. I know nothing of its timber.

HERITIERA. Ait.

Gen. Char. : Flowers unisexual, calyx 5 toothed or 5 cleft, petals 0, staminal column slender bearing on the outside below the summit a ring of 5 anthers with parallel cells, ovaries 5 nearly distinct 1 ovulate, style short with 5 rather thick stigmas, fruit carpels woody indehiscent keeled or almost winged on the back, seeds without albumen, cotyledons very thick, the radicle next the hilum. Trees, leaves undivided coriaceous scurfy underneath penninerved, flowers small in axillary panicles.

1. Heritiera littoralis, *Ait.*—A tree attaining a considerable size, leaves very short petiolate oval or oblong, the larger ones fully 8 inches by 4, but often much smaller, quite entire coriaceous glabrous above, silvery underneath with a close scaly tomentum, flowers small numerous, in loose tomentose panicles in the upper axils much shorter than the leaves, calyx about 2 lines long, staminal column in the males, pistil in the females much shorter than the calyx, fruit carpels sessile ovoid 2-3 inches long thick and almost woody with a slightly projecting inner edge and a strong projecting almost winged keel along the outer edge. *Benth. in Fl. Austral.* Nagam, *Rheede.* 6 *t.* 21. Balanopteris Tothila, *Gærtn. fr.* 2. *t.* 99.

This tree is found about the sea coast throughout India, Ceylon and Birmah, and extends to Australia and Africa ; it is called Sundri in Hindustani, Kanazoe in Birmah, and Attoona in Ceylon ; the wood is strong, fibrous and flexible, tolerably close and straight grained, not very durable, of a light red color turning to reddish brown, and not easily worked ; a cubic foot unseasoned weighs from 75 to 80 lbs., and when seasoned 64 lbs.; its specific gravity is 1·024. It is used for poles and shafts of carriages, and spokes of wheels, and makes excellent firewood.

Analysis of this genus will be shortly given.

KLEINHOVIA. Linn.

Gen. Char. : Bractlets small, sepals 5 deciduous, petals unequal the upper ones with a long stalk, margins involute at the base, column elongate adherent to the gynophore expanding above into a bell-shaped cup which is divided into 5 subdivisions each bearing 3 anthers, anther cells divergent, ovary stalked concealed within the cup of the anthers 5 lobed 5 celled with 3-4 ovules in each cell, style slender, capsule pyriform membranous distended 5 lobed loculicidally 5 valved, seeds 1-2 in each cell globose tubercled exalbuminous, cotyledons spirally twisted, radicle next the hilum. A tree with entire leaves and rosy flowers in loose panicles.

Kleinhovia hospita, *Linn.*—An ornamental middling sized tree, leaves cordate ovate subacuminate entire palmately 3-5 ribbed smooth 2-4 inches long by 2-3 broad, petioles about 1 inch long, flowers pinkish slightly fragrant numerous arranged in much-branched spreading cymes ; pedicels downy jointed, calyx 5 parted, segments revolute, petals 5 tubular unequal in size, column curved dilated above into a campanulate cup which divides into 5 phalanges of 3 stamens each without any intermediate staminodes, fruit pyriform bladdery 5 lobed 5 winged, seeds 2 or 3 in each cell roundish tuberculate. *Oliver Fl. Af.* 1. 226.

This very ornamental tree is common in a cultivated state throughout the peninsula, but I have never observed it in any of our forests. I am not acquainted with the timber.

Analysis of Genera, Pl. IV, fig. 4.

Kleinhovia hospita—1 full flower, 2 stamen tube and ovary, 3 stamens and staminodia, 4 ovary cut transversely, showing also position of stamens and staminodia. (Drawn by Dr. Thwaites.)

HELICTERES. Linn.

Gen. Char. : Calyx tubular, 5-cleft at the top, often oblique. Petals 5, equal or the 2 upper ones broader, the claws elongated, and all or two of them often with a lateral appendage. Staminal column adnate to the gynophore, truncate at the top, or more frequently bearing 5 teeth or small lobes (staminodia) with 1 or 2 stipitate anthers between each, anther cells divaricate, often confluent into one. Ovary nearly sessile on the top of the staminal column, 5-lobed, 5- celled, with several ovules in each cell. Styles 5, subulate more or less connate slightly thickened and stigmatic at the top. Fruit carpels distinct or separating, opening along their inner edge, straight or spirally twisted. Seeds with little albumen, cotyledons leafy folded round the radicle. Trees or shrubs, with stellate or branched tomentum. Leaves entire, serrate or obscurely lobed. Flowers axillary, solitary or clustered. Bracteoles none or distant from the calyx, capsules usually tomentose, the clusters of tomentum often forming long woolly processes. The appendages on the claws of the petals appear to vary in different flowers of the same species.—Methorium, *Schott.*

1. Helicteres Isora, *Linn.* ; *Dc. Prod.* i. 475.—A shrub with a rather rough stellate pubescence. Leaves on short petioles, broadly obovate or orbicular, often oblique, irregularly toothed or the lower ones obscurely 3 lobed, mostly about 4 inches long, scabrous above, more or less tomentose underneath or sprinkled with short stellate hairs. Pedicels short, usually 2 or 3 together. Calyx $\frac{1}{2}$ inch long

or rather longer, obliquely and unequally 5-toothed. Petals red, twice as long as the calyx, 2 of them much broader than the 3 others. Anthers 10, on short filaments, alternating in pairs with the linear staminodia round the ovary. Fruit about 1 inch long on a stalk of $1\frac{1}{2}$ to 2 inches, slightly tomentose, the carpels spirally twisted. *Wight Ic. t.* 180 ;—*Bot. Mag. t.* 2061.

This shrub is very common throughout the peninsula, and only used for fuel as far as I know ; in Hindustani it is called Murroree kà jhàr on account of its curious cork-screw like capsules ; in Teligu it is called Guba darra and Kavanchi, and in the Godavery forest Itah.

Analysis of Genera, Pl. V, fig. 1.

Helicteres Isora—1 the fruit, 2 same cut transversely, showing the 5 cells.

PTEROSPERMUM. Schreb.

Gen. Char. : Bracteoles 3, entire or laciniate, sometimes very deciduous, or none. Calyx tubular, 5 cleft, deciduous. Petals 5, often very long deciduous. Staminal column adnate to the gynophore, divided at the top into 5 linear clavate staminodia, with 3 stipitate anthers between each ; anther-cells linear, parallel. Ovary sessile in the top of the column, 5 celled with several ovules in each cell. Style undivided, club-shaped, and 5-furrowed at the top. Capsule woody or coriaceous, ovoid or oblong terete or angular opening loculicidally in 5 valves. Seeds ascending, produced into a wing at the top ; albumen little or none ; cotyledons wrinkled or folded ; radicle inferior, rather long. Trees clothed with a stellate tomentum or scurfy scales. Leaves coriaceous, often oblique, entire, cuneate toothed or angled at the upper end, penninerved or several nerved at the base. Peduncles short, axillary, 1 flowered. Flowers often several inches long.

1. Pterospermum rubiginosum, *Heyne.*—For description, see letter press to Plate No. cvi.

2. Pterospermum suberifolium, *Lam.*—A middling sized timber tree, trunk straight, leaves cuneate oblong shortly acuminate coarsely toothed or sometimes irregularly lobate at the apex, obliquely cordate at the base, very white underneath and covered when young with rust-colored tomentum above, which soon falls off, 3-4 inches long by $1\frac{1}{2}$ to 2 broad, petioles about $\frac{1}{2}$ an inch long, peduncles axillary 1-3 flowered about length of the petioles, flowers about $1\frac{1}{4}$ inch across, bracteoles of the calyx about 3 linear entire a little distant from the flower very early caducous, petals linear oblong patent, sterile filaments filiform, ovary with 4 ovules in each cell, capsule obovoid acutish, outside encrusted with dense furfuraceous pubescence, seeds usually 2 in each cell. *Lam. Ill. t.* 576. *f.* 1 ;—*WA. Prod. p.* 68. Pterospermum canescens, *Roxb. Fl. Ind.* iii. *p.* 162—not suberifolium, *Roxb. l. c. p.* 160, which is P. Heyneanum.

Common in the Cuddapah and North Arcot forests, in the Godavery forests, Madura, and elsewhere to the south, and in Ceylon ; it is called Lolagu in Teligu and Velenge in Ceylon ; it does not ascend the hills much over 2,500 feet ; its timber is tough and used for building and various other purposes.

3. Pterospermum Heyneanum, *Wall.*—A middling sized tree, trunk tolerably straight, young shoots, leaves, bractes, calyx and capsule covered with stellate rust-colored pubescence, leaves cuneate-oblong acuminated retuse or slightly cordate at the base and sometimes a little oblique coarsely toothed or lobed towards the apex, underside clothed with roughish tomentum, glabrous in age on the upper side, about 4 inches long by $1\frac{1}{2}$ broad, petioles 3-4 lines long, attached a little within the margin, peduncles axillary thick much shorter than the petioles, flowers large fragrant, the sepals being about 2 inches long, petals pure white, bracteoles of the calyx imbricated round the base of the bud palmatifid and laciniate deciduous but not till some time after the expansion of the flower, petals obovate patent, sterile filaments linear, capsule oblong acute, seeds 8 in each cell. *WA. Prod. p.* 69 ;—*Wight Icones tab.* 489. Pterospermum suberifolium, *Roxb. Fl. Ind.* i. 160.

This tree is not uncommon throughout the forests of the peninsula and in Bengal, but it does not occur in Ceylon. The timber is white and rather soft.

4. Pterospermum reticulatum, *WA.*—A middling sized tree, leaves cuneate oblong 4 nerved oblique and slightly cordate at the base acuminated entire or coarsely toothed towards the apex, under side covered with white mealy pubescence reticulated with prominent veins, peduncles about 3 flowered crowded towards the extremities of the branches longer than the petioles, bracteoles of the calyx palmatifid a little distant from the flower caducous, petals obovato oblong patent, sterile filaments filiform, ovary with about 6 ovules in each cell. *WA. Prod. p.* 69.

Forests of the Madras Presidency. I have not met with this tree ; the flowers are intermediate in size between those of P. suberifolium and Heyneanum.

5. Pterospermum glabrescens, *WA.*—A middling sized tree, leaves cuneate-obovate, shortly acuminated entire cordate equal and 5 nerved at the base, under side very shortly pubescent, veins conspicuous, petioles short, stipules palmate persistent, peduncles axillary about the length of the petioles, flowers very large the sepals being 5 or $5\frac{1}{4}$ inches long by $\frac{1}{4}$ inch broad, ovary supported on a long slender gynophore, capsule oblong 5 angled suddenly acuminated glabrous, cells 10-12 seeded. *WA. Prod. p.* 69 ;—*Rheede. Mal.* 6. *t.* 58.

This very handsome tree is not uncommon on the South Cannara ghats, Wynad, Tinnevelly, and elsewhere in our western forests.

6. Pterospermum obtusifolium, *Wight.*—A middling sized tree, leaves cuneate at the base very broad truncated at the apex sometimes irregularly 2 lobed or somewhat obcordate, the lobes coarsely toothed glabrous above under side covered with mealy

whitish pubescence reticulated with prominent veins, sepals linear, corol densely covered externally with white stellate pubescence capsules ovate very obtuse or roundish at the apex covered with dense rusty colored furfuraceous tomentum, seeds about 4 in each cell, *Wight Ill. p.* 78.

Tinnevelly and Anamallay forests, (I have not seen the tree in flower.)

7. Pterospermum acerifolium, *Willd.*—A good sized tree, bark smooth light ash-colored, leaves peltate, roundish or oval entire or coarsely toothed cordate at the base when young covered on the upper side with much stellate pubescence (as are all the tender parts), at length glabrous above but the under side remains very hoary; 8-12 inches long, petioles round elongated, stipules many cleft caducous, peduncles axillary very short 1-2 flowered, bracteoles of the calyx many cleft very caducous, flowers very large pure white and fragrant, petals linear revolute, sterile filaments club-shaped, ovary oblong 5 angled with 12-14 ovules in each cell, capsule 6 inches long, oblong 5 angled encrusted outside with a furfuraceous pubescence. *Roxb. Fl. Ind.* iii. *p.* 158.

I have only seen this very handsome tree in gardens, but I believe that it is found in some parts of this Presidency and in the Assam jungles.

Pterospermum semisaggitatum, *Buch.*, with the leaves curiously half saggitate at the base, and P. lancefolium, with lanceolate entire leaves, are both trees only found in Northern India.

ERIOLÆNA. DC.

Gen. Char.: Bracteoles of the calyx 3-5 laciniate, or small and caducous, calyx 5 cleft or at length 5 parted, petals 5 deciduous, claws dilated tomentose, lamina plane glabrous, staminal column bearing on its outside numerous 1 anthered filaments in many series up to the apex, staminodes 0, anthers erect oblongo-linear, cells parallel, ovary sessile 5-10 celled, cells many ovuled, style stigmatose at the apex, stellately 5-10 lobed, capsule woody dehiscing loculicidally, seeds produced into a wing, albumen thin, cotyledons plicate or contortuplicate, radicle near the hilum. Trees, leaves cordate serrate, stellately pubescent or tomentose beneath, peduncles axillary 1-many flowered, flowers large, pollen globose muricate. Microlæna, *Wall.* Jackia, *Spreng.* Schillera, *Reichb.* Wallichia, *DC.*

1. Eriolæna Hookeriana, *WA.*—A small tree, leaves roundish cordate shortly acuminate coarsely toothed, upper side sparingly covered with small star-like tufts of hair at length glabrous, underside densely pubescent, 5-6 inches long by 4-5 broad, petioles 2 3 inches long, peduncles axillary 3-8 inches long, 3 flowered, densely starry pubescent when young, glabrous in age, flowers nearly 2 inches across, bracteoles of the calyx $\frac{1}{2}$ to $\frac{3}{4}$ as long as the flower bud much cut and jagged densely starry pubescent, deciduous before the flower expands, sepals acuminated densely starry pubescent on the outside silky within and furnished with 2 hollow glands on the inside at the base, style densely pubescent, stigma 8-10 lobed hairy, ovary 8-10 celled, capsule ovate. *WA. Prod. p.* 70.

A small tree, common throughout the Presidency and ascending the mountains to about 4,000 feet; its timber is very tough and strong, and much prized by the natives for ploughs and various other uses; it is called Nár botku in Teligu, and it yields a useful fibre.

2. Eriolæna quinquelocularis, *WA.*—A small tree, leaves round cordate shortly acuminate serrate, above sparingly covered with tufts of starry pubescence, beneath silvery with close set soft stellate tomentum, about 3 inches each way, petioles $\frac{3}{4}$ to 1 inch long, peduncles axillary from nearly as long to longer than the leaves scaly, generally 2 flowered, bracteoles of the calyx minute 3-5 lobed very early caducous, flowers much smaller than in E. Hookeriana and the anthers fewer and confined more to the apex of the column, ovary 5 celled, ovules numerous in a double row in each cell, stigma 5 lobed hairy, capsule woody 5 celled, seeds winged. Microclæna quinquelocularis, *WA. Prod. p.* 71;—*Wight. Icones tab.* 882.

Very common on the slopes of the Nilgiris and in Wynad, and widely distributed in the western forests of the Madras Presidency and in Mysore; the timber is strong and used by the natives.

Analysis of Genera, Pl. V, fig. 2.

Eriolæna Hookeriana—1, bud showing the bracteoles at the base of the calyx; 2, a full flower; 3, a sepal; 4, a petal; 5, underneath view of the same; 6, stamen-tube; 7, anther, back and front view; 8, ovary and style, showing an 8 lobed stigma (10 lobes are more common.)

Eriolæna quinquelocularis—9, 10, ovary and 5 lobed style.

MELOCHIA. Linn.

Gen. Char.: Calyx 5 cleft bell-shaped, petals 5 oblong spathulate marcescent, stamens 5 opposite the petals connate at the base, anthers 2 celled, cells parallel, ovary sessile or stalked 5 celled, cells 2 ovuled, styles 5 free or connate at the base, capsule loculicidally 5 valved, cells 1 seeded, seed ascending, embryo straight. Trees (shrubs or herbs) with downy leaves, flowers small in axillary or terminal cymose clusters or spikes. Riedleia, *Vent.* Polychlæna, *Don.* Visenia, *Houtt.* Mougeotia, *H. B. et K.* Lochemia, *Arnt.* Aleurodendron, *Reinw.* Glossospermum, *Wall.* Altheria, *Thouars.* Anamorpha, *Karst. et Triana.* Physocodon, *Turcz.*

Melochia velutina, *Wall.*—An ornamental tree, leaves ovate or subcordate acuminate sharply and rather deeply serrate, 3-4 inches long by $1\frac{1}{2}$-2 broad, very downy especially beneath, petioles 1-2 inches long, corymbs downy axillary umbellate many-flowered, flowers numerous small pale pink, calyx furnished with silky hairs, lobes acute, filaments flat and more or less connate nearly their whole length but easily separable into 5 distinct stamens. Visenia umbellata, *Wight. Icones tab.* 509—(incorrect as to the stamen tube.) Glossospermum velutinum, *Wall.*

This very ornamental flowering tree is common in gardens, but has been introduced from Java.

Analysis of Genera, Pl. V, fig 3.

Melochia velutina—1, full flower ; 1*a*, a petal ; 2, a flower, petals removed, showing the 5 stamens ; 3 ovary and styles; 4, a young fruit ; 5, fruit cut transversely ; 6, anther front and back view.

ABROMA. Jacq.

Gen. Char. : Calyx 5 parted, petals 5 saccate at the base with a large oblong deciduous unguiculate appendage, staminal tube a 5 lobed urceolus, lobes petaloid obcordate curved outwards alternate with the petals, stamens in the sinuses united into 5 filaments each bearing 2-4 anthers, cells divaricate, ovary sessile 5 celled, cells many ovuled, styles 5 short connivent, capsule ovoid membranaceous 5 celled with 5 prominent angles, each cell dehiscing above, seeds numerous albuminous, embryo straight, cotyledons plane cordate, radicle near the hilum. Small trees, with stellate pubescence, leaves cordate angled or lobed, flowers showy purple.

Abroma angusta, *Linn.*—A small ornamental tree, branches velvetty, leaves ovate-oblong to roundish cordate 3-5 angled acuminate serrulate, under side tomentose or more or less scabrous with stellate pubescence, 8-10 inches long by 4-6 broad, petioles $\frac{1}{2}$-$\frac{3}{4}$ inch long, peduncles leaf-opposed, wings of the fruit truncated at the apex with the exterior angle somewhat acute. *WA. Prod. p.* 63 ;—*Roxb. Fl. Ind.* iii. *p.* 156.

A small ornamental tree, indigenous in the interior of the peninsula and often met with in gardens ; it flowers abundantly in the rains and the seeds ripen in the cold season. The bark abounds with strong white fibres which make a good hemp ; the tree grows rapidly and yields annually several crops fit for peeling. To prepare the fibre the bark is steeped in water for about a week, beyond which it requires no further clearing, and in this state is stronger than the hemp of the Crotalaria juncea (*San*), and not liable to become weakened by exposure to wet. The tree is very easy of culture and grows well almost anywhere in the plains.

Analysis of Genera, Pl. V, fig. 4.

Abroma angusta—1, a flower bud shut ; 2, the same with the calyx opened out, showing the concave dilated claws at the base of the petals ; 3, a petal ; 4, stamen tube ; 5, the same opened, inside view, and the ovary and styles ; 6, a young fruit.

GUAZUMA. Plum.

For Gen. Char. see letter press to Pl. cvii.

Guazuma tomentosa.—For description, &c., see Pl. cvii.

ORDER XVII.—TILIACEÆ.

Flowers regular, hermathrodite or rarely unisexual. Sepals 5, rarely 3 or 4, free or more or less cohering, usually valvate Petals as many or fewer or none, alternate with the sepals, inserted round the base of the torus. Stamens indefinite, rarely reduced to very few, inserted on the torus, which is often raised or disk-like. Filaments free or slightly united at the base. Anthers 2-celled, with parallel or rarely divaricate cells opening in longitudinal slits or in terminal pores. Ovary free sessile 2-or more celled. Style simple and entire, or divided at the top into as many stigmatic teeth or lobes as there are cells. Ovules 1, 2, or more in each cell, erect, pendulous, or horizontal. Fruit capsular or indehiscent, with single-or several-seeded cells, where several-seeded the cells often subdivided by spurious vertical or transverse partitions. Seeds without any arillus, the testa usually coriaceous or crustaceous. Albumen fleshy, rarely deficient. Embryo straight or rarely curved or slightly folded. Cotyledons leafy or rarely fleshy, the radicle next to the hilum, usually shorter than the cotyledons. Trees, shrubs or rarely herbs. Leaves alternate or very rarely opposite, simple with pinnate or palmate nerves, entire, toothed, or rarely lobed. Stipules usually free, and small or deciduous. Flowers axillary, terminal or leaf-opposed, usually in little cymes, often almost umbellate, either solitary and sessile or pedunculate, or arranged in panicles.

Pityranthe verrucosa and Berrya Ammonilla are Ceylon trees ; the latter, which has been introduced into this Presidency, yields the Trincomalee wood. Erinocarpus Nimmonii is a tree found on the Bombay ghats ; the genus Grewia is largely represented, yielding about 18 *species. G. tiliæfolia is a large tree yielding a valuable timber, and G. abutilifolia, salvifolia, Asiatica and lœvigata grow to small trees ; but all the other species are only shrubs. Leptonychia,* 1 *small tree ; Elæocarpus is represented by* 11 *trees, some of which yield very good timber ; the timber of most of these latter is unknown, and is well worthy the attention of forest officers.*

Tribe I, Brownlowieæ.—Sepals combined into a 3-5 fid campanulate calyx, anthers small globose, lobes sometimes confluent at the apex.

5 interior stamens sterile ... ... Pityranthe.
Stamens all fertile ... ... Berrya.

Tribe II, Grewieæ.—Sepals distinct, petals glandular at the base internally, torus elongated, anthers subglobose or short, lobes parallel.

Fruit unarmed glabrous or tomentose, stamens numerous free all fertile ... ... Grewia.
Fruit unarmed glabrous or tomentose, stamens 10 monadelphous with 5 staminodia, one between each pair of stamens ... ... Leptonychia.
Fruit echinate ... ... Erinocarpus.

Tribe III, Elæocarpeæ.—Anthers linear dehiscing at the apex, petals inserted round the base of the antheriferous glandulose elevated torus ... ... Elæocarpus.

PITYRANTHE. Thw.

For Gen. Char. see letter press to Pl. cix.

1. Pityranthe verrucosa, *Thw.*—For description, &c., see Pl. cix.

BERRYA. Roxb.

For Gen. Char. see letter press to Pl. lviii.

1. Berrya Ammonilla, *Roxb.*—For description, &c., see Pl. lviii

GREWIA. Linn.

For Gen. Char. see letter press to Pl. cviii.

1. Grewia tiliæfolia, *Vahl.*—For description, &c., see Pl. cviii.

2. Grewia Asiatica, *L.*—A small tree, leaves 5 nerved, roundish-cordate obtuse or acutish sometimes unequal at the base unequally serrated, upper side at length nearly glabrous under side glabrous pubescent or hoary 4-5 inches long by 3-4 broad, stipules lanceolate subulate 1 nerved ½ as long as the petiole, peduncles axillary 2-4, or opposite the leaves, twice or thrice as long as the petiole 3 flowered and as well as the petioles divaricating, sepals oblong-lanceolate twice the length of the narrow obovate petals, torus scarcely longer than the glands, style about equal to the stamens, stigma 4 lobed, drupes globose with 1-2 one-celled nuts. *WA. Prod. p.* 79. Grewia subinæqualis, *DC. Prod.* 1. 511.

A small tree or large shrub common throughout India, called in Hindustani Phálsá ; the fruit is eaten by the natives ; it is also found in Africa.

3. Grewia lævigata, *Vahl.*—A small tree, with subglabrous branches, leaves on very short petioles oval tapering or rounded at the base, very gradually attenuated at the apex into a long narrow acumination, serrated except at the base, 3 nerved at the base prominently arcuate venose beneath, in age quite glabrous above slightly hairy on the veins beneath, 2-8 inches long by 1-3 broad, stipules about 3 lines long with a long narrow point, peduncles solitary axillary or 2-3 together, 2 or 3 times longer than the petioles 2-3 flowered, bractes conform to the stipules much shorter than the pedicels, sepals linear narrow 3-4 times longer than the oblong entire bluntish petals, torus short, drupe deeply 2 lobed, lobes the size of small peas glabrous, nuts 1-2 in each lobe, 1-2 celled. *DC. Prod.* 1. 510, G. didyma, *Roxb Fl. Ind.* ii. 591.

A small tree not uncommon throughout the Madras Presidency ; found also in Africa.

4. Grewia salvifolia, *Heyne.*—A small tree or shrub, the younger branches, petioles and pedicels covered with ferruginous or pale down, petioles about ¼ inch long dilated at the apex, stipules subulate acuminate longer than the petioles, leaves obliquely subcordate oblong or lanceolate sharply serrate or subentire, 3-costate, arcuate-venose, nearly glabrous above cinereo-tomentose below, peduncles axillary or terminal, solitary or twin about the same length as the petiole, and dividing into 3 pedicels, flower buds cylindrical oblong, flowers ½ inch in diameter, sepals oblong obtuse cinereo-tomentose, nerves prominent, petals notched shorter than the stamens, ovary pubescent, drupes 1-2 lobed, lobes globose the size of a small pea thinly covered with short bristly hairs, at length glabrous and each containing a bony 4 celled nut, seeds 1 in each cell. *Heyne in Roth. Nov. Sp. p.* 239 ;—*WA. Prod. p.* 77 ;—*Roxb. Fl. Ind.* ii. 587. Grewia Rothii, *DC. Prod.* 1. 509 ;—*WA. Prod. p.* 78. Grewia bicolor, *Roth.*

A small tree, common in many parts of the Madras Presidency, particularly in the Northern Circars, where it is called Jàrà ; the leaves are very white beneath ; it is found also in Africa.

5. Grewia abutilifolia, *Juss.*—A small tree, leaves 3 nerved roundish-cordate sometimes with a few sharpish lobes, irregularly and coarsely toothed, upper side rough under harshly tomentose, peduncles several together axillary about ½ as long as the petiole 3-4 flowered, sepals oblong about thrice the length of the oblong entire petals, torus scarcely longer than the glands, style about the length of the stamens, drupes 4 lobed, pubescent and hairy when ripe sometimes nearly glabrous, nuts 4 or fewer by abortion 1-2 celled. *Juss. in Ann. Mus.* 4. *p.* 92 ;—*WA. Prod. p.* 79. Grewia aspera, *Roxb. Fl. Ind.* ii. 590.

A small tree, common in many parts of the Madras Presidency ; in the Circars it is called in Telugu Pedda tarraki.

The following species of this genus are found in Southern India, but are never more than small shrubs.

6. Grewia Orientalis, *L.* ; *WA. Prod. p.* 76.
7. Do. bracteata, *Roth.* ; *WA. Prod. p.* 76.
8. Do. columnaris, *Sm.* ; *WA. Prod. p.* 76.
9. Do. helicterifolia, *Wall.*—In Tinnevelly and Ceylon. *Walps. Rep.* ii. 799.
10. Do. pilosa, *Lam.* ; *WA. Prod. p.* 78.
11. Do. hirsuta, *Vahl.* ; *WA. Prod. p.* 78.
12. Do. emarginata, *WA. Prod. p.* 79.
13. Do. villosa, *WA. Prod. p.* 79.
14. Do. rotundifolia, *Juss.* ; *WA. Prod. p.* 80.
15. Do. populifolia, *Vahl.* ; *WA. Prod. p.* 80.
16. Do. microcos, *Linn.* ; *WA. Prod. p.* 81.
17. Do. diplocarpa, *Thw. En. Pl. Zey. p.* 31.—Ceylon. I have also an undescribed species from South Canara, with oblongo-ovate very suddenly pointed asperous leaves, and axillary or supra-axillary long stalked umbelled heads each containing 25-30 flowers. (Grewia umbellifera, *Bedd*).

LEPTONYCHIA. Turcz.

For Gen. Char. see letter press to Pl. cxiv.

Leptonychia Moacurroides, *Bedd.*—For description, &c., see Pl. cxiv.

ERINOCARPUS. Nimmo.

For Gen. Char. see letter press to Pl. cx.

1. Erinocarpus Nimmonii, *Grah.*—For description, &c., see Pl. cx.

ELÆOCARPUS. Linn.

For Gen. Char. see letter press to Pl. cxi.

1. Elæocarpus amænus, *Thw.*—For description, &c., see Pl. cxi.

2. Elæocarpus serratus, *Linn.*—A large tree, leaves petioled alternate elliptical obtuse bluntly serrated, nerves with gland in their axils and at most of their subdivisions, petioles with a small gland on each side near the apex, racemes simple from the axils o the leaves and scarcely so long, stamens 20-30, exterior anther valve bearded with 3-5 small hairs, ovary 3 celled, ovaries 2 in each cell, drupes oblong, nut oblong very hard indehiscent prominently tubercled 1 celled 1 seeded. *Linn. Sp. Pl. p.* 734 ;—*WA. Prod. p.* 82.

A common tree in all our western forests and in Ceylon ; the wood is worthy of attention ; the fleshy exterior of the fruit is eaten ; the tree is called Weeralu in Ceylon.

3. Elæocarpus oblongus, *Gærtn.*—A large tree, leaves petioled alternate elliptic oblong with blunt and often shallow serratures, nerves with glands in some of the axils or often without any, petioles with a small gland on each side near the apex, racemes simple from the axils of the fallen leaves and considerably shorter than the leaves, stamens 30-40, anther valves naked, ovary sessile 3-celled, cells 2 ovuled, drupes oblong, nut oblong very hard indehiscent prominently tubercled 1 celled 1 seeded. *Gærtn. fr. t.* 43 ;—*WA. Prod p.* 82. Perin-kara, *Rheede. Mal.* 4. *t*, 24.

Malabar, Nilgiris, Anamallays and western forests generally, but not extending to Ceylon ; it is called Bikki by the Burghers on the Nilgiris, where the wood is much esteemed ; it is white, strong and tough, and adapted for the lathe.

4. Elæocarpus montanus, *Thw.*—A middling sized tree, leaves ovate or rotundate obtuse denticulate sparingly hirsute (younger ones tomentose beneath), the primary veins furnished with conspicuous glands in their axils, 2-3½ inches long, petiole ½-1 inch long, racemes axillary equalling the leaves tomentose, anthers naked, ovary 3 celled, cells 2 ovuled, drupe spherical. *Thw. En. Pl. Zey. p.* 32.

Ceylon, on the higher mountains.

5. Elæocarpus coriaceus, *Hooker.*—A middling sized tree, leaves coriaceous glabrous very obtuse above, somewhat cuneate downwards, slightly serrated on the margin, occasionally somewhat cordate at the base, glands in the axils of the veins, racemes axillary, flowers drooping, sepals lanceolate tomentose, anthers naked, ovary 3 celled and surrounded by glands, cells 2 ovuled, drupe globose, putamen ruguloso-tuberculate. *Hook. Ic. Plant. v.* 2. *t.* 154. E. obovatus, *Arnt.* (not *Don.*)

Ceylon, on the higher mountains.

6. Elæocarpus cuniatus, *Wight.*—A middling sized tree, leaves cuneate obovate, terminating in a short obtuse acumen tapering below into the petiole, anthers bearded, hairs at length reflexed, ovary 3 celled elevated on a prominent torus, thickly clothed with white hairs, cells 2 ovuled. *Wight. Ill. p.* 83.

Quilon.

7. Elæocarpus subvillosus, *Arnt.*—A middling sized or small tree, leaves subcoriaceous broadly ovate or obovate crenato-serrate, glandular beneath, the younger ones pubescent above, tomentose beneath, at length nearly glabrous on both sides, 4-5 inches long by 2-2½ broad, petioles 1-1¼ inches long tomentose, racemes tomentose axillary or from the axils of the fallen leaves as long or a little longer than the leaves, flowers short pedicelled, pedicels and bracts hairy, anthers 20-25, cells villous naked at the apex or rarely with 2-3 small hairs on the exterior valve, ovary villose, 3 celled, cells 2 ovuled, drupe oblong, putamen tuberculate acute at the apex. *Arnt. Pug. v.* 323. E. pubescens, *Hooker Ic. Pl.* ii. *t.* 155.

Ceylon, Saffragram district up to 2,000 feet elevation.

8. Elæocarpus ferrugineus, *Wight.*—For description, &c., see Pl. cxii.

9. Elæocarpus tuberculatus, *Roxb.*—For description, &c., see Pl. cxiii.

10. Elæocarpus glandulifera, *Hooker.*—A large tree, leaves ovate lanceolate, somewhat undulated on the margin, crenately serrated glabrous, with or without saccate glands in the axils of the nerves beneath, racemes axillary from a little shorter to about the length of the leaves many flowered, flowers drooping short pedicelled, sepals lanceolate acute, petals pubescent not involute on the margins, anthers furnished with a few hairs at the apex which are at length reflexed, ovary elevated on a torus very hairy 2 celled, cells with several ovules, drupe oval size of an olive. *Hooker MS.* ;—*Wight. Ill. p.* 84. Monocera Munronii, *Wight. Ill. p.* 84.

A very large handsome tree, abundant in Coorg, the Wynad, Nilgiris, and throughout our western forests, from an elevation of about 2,500 feet up to 6,000, also in Ceylon. On the Nilgiris it is called Kal bikki by the Burghers, and the timber (which much resembles that of E. oblongus) is much esteemed ; it is whitish, with a brown heart.

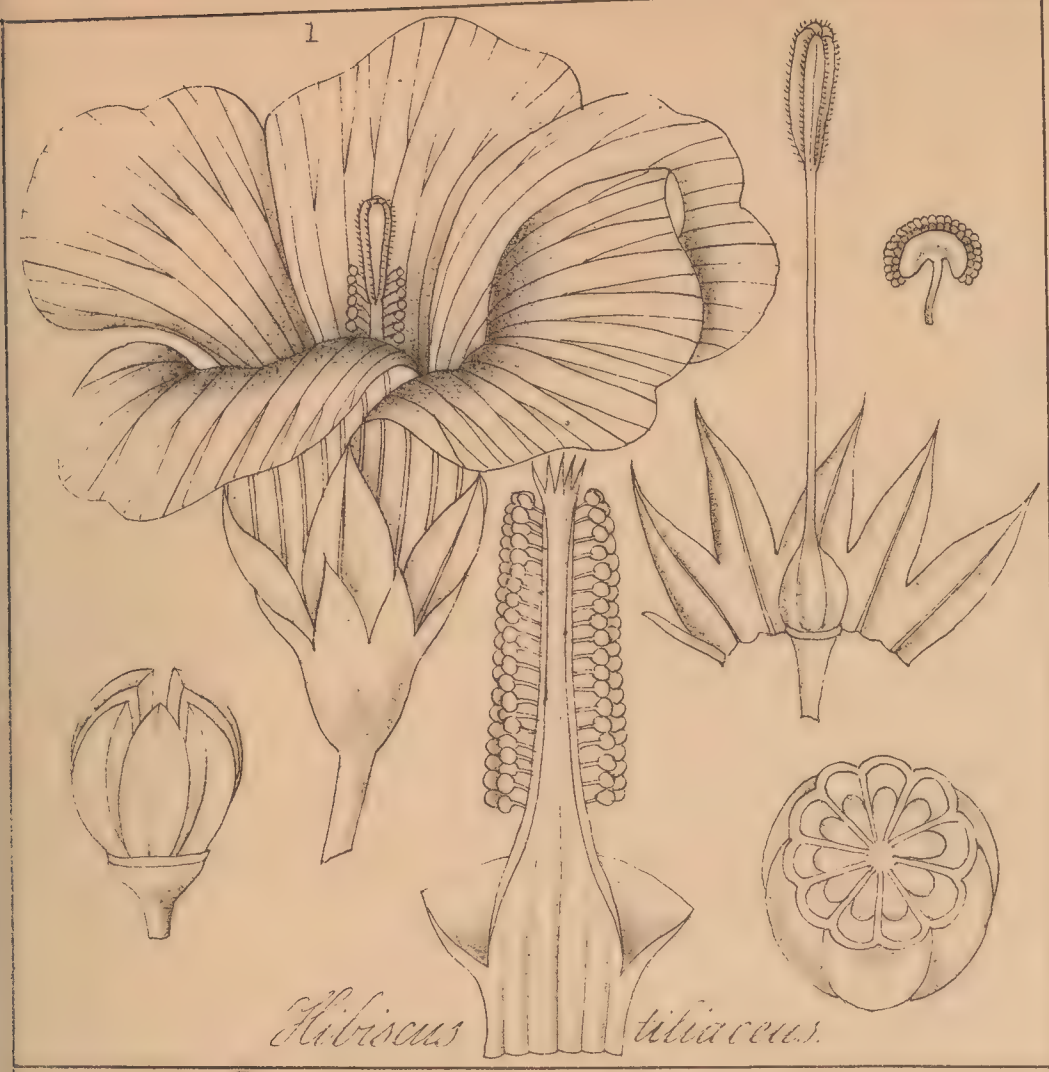
Elæocarpus ganitrus, *Roxb.*—A good sized tree, leaves short petioled lanceolate serrulate when very young slightly sericeous at length glabrous on both sides, about 6 inches long by 1½ broad, stipules minute conical caducous, racemes from the axils of fallen leaves, a little shorter than the leaves, flowers white drooping, each with a solitary bract at the pedicel, and 2 below the calyx, oblong, villous, with the anterior margin dentate very early caducous, sepals lanceolate acute the length of the petals slightly villous on both sides one ribbed on the inside, petals somewhat villous, filaments about 40, anther cells sometimes furnished with a few distinct hairs at the apex, ovary 5 celled with about 4 ovules in each cell attached to the upper end of the axis, style longer than the stamens 5 grooved, stigma simple small acute, drupe globose smooth size of a large cherry of a deep purple, putamen tuberculate and marked with 5 equidistant deep grooves, seeds 1 or 2. *Roxb. Fl. Ind.* ii. *p.* 592. Ganitrus sphærica, *Gærtn. Sem.* 2. *p.* 271. *t.* 139.

This tree is found on the Canara ghats and in the Bombay Presidency, in Northern India ; and in the Malay Archipelago it is called Roodrack by the natives, a name given generally to most of the Elæocarps ; and the seeds of this and several other species are worn as beads by Fakeers, and are often set in gold as bracelets, &c., as European ornaments. This genus is abundantly represented in the forests in Northern India, in Java, Birmah, the Malay Peninsula, and Australia, and there are upwards of 50 species known.

ANALYSIS OF GENERA

Malvaceæ.

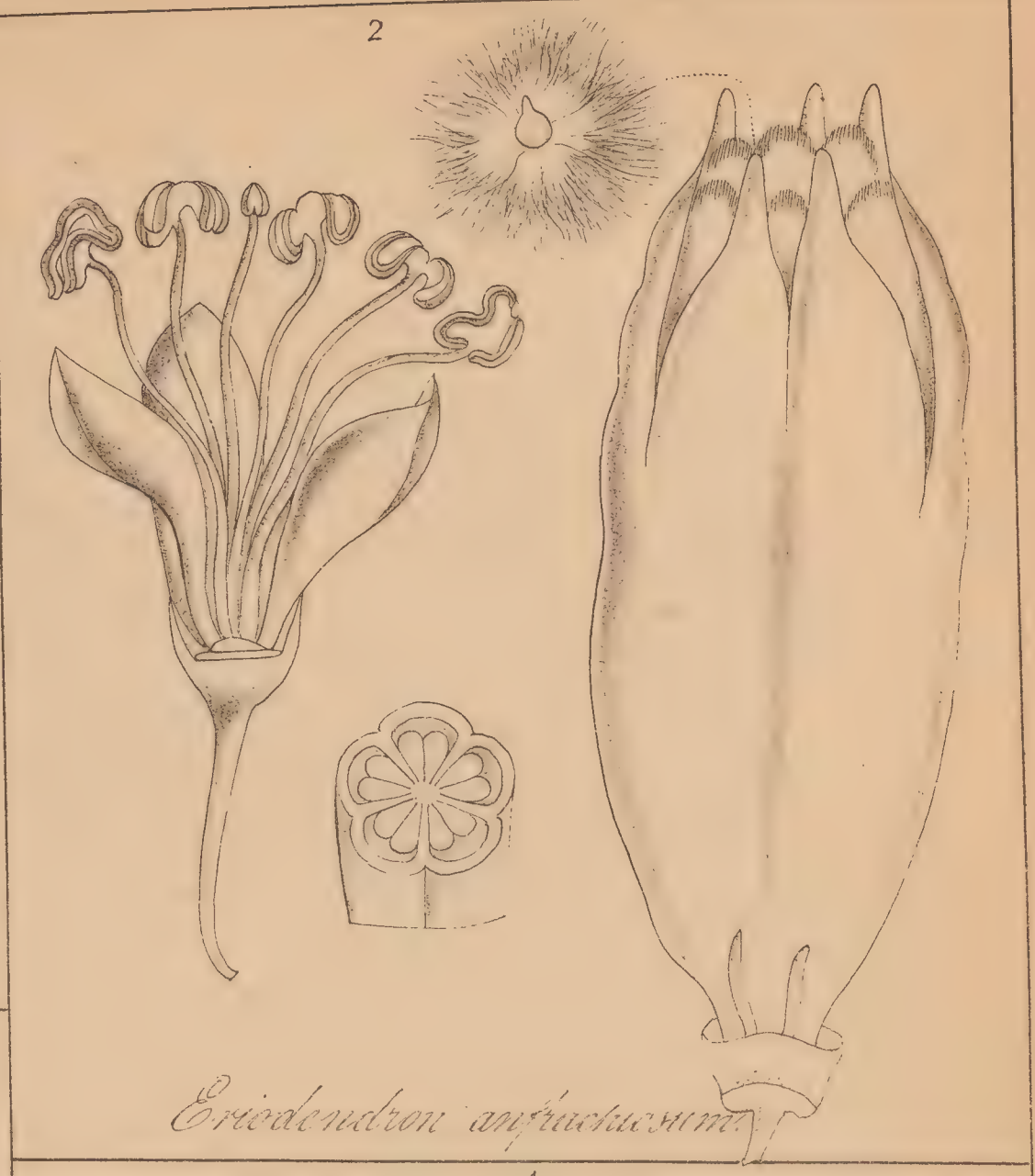
1



Hibiscus tiliaceus.

Sterculiaceæ.

2



Eriodendron anfractuosum.

3

Bullenia excelsa.

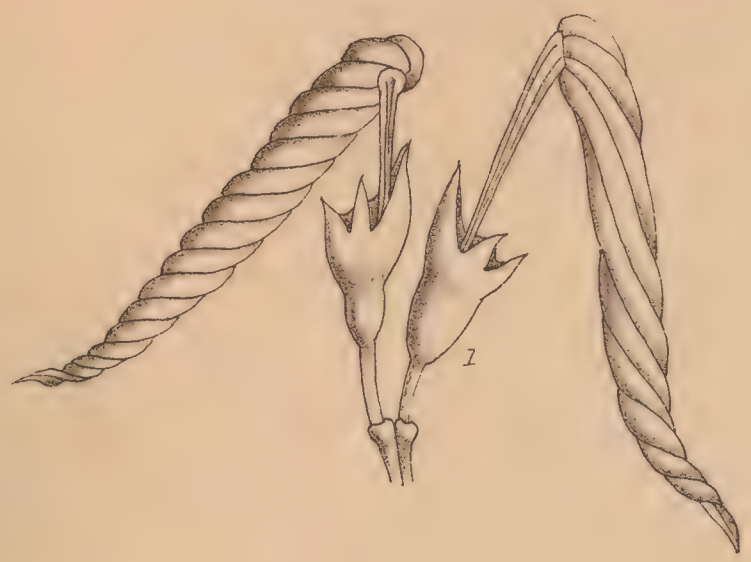
4

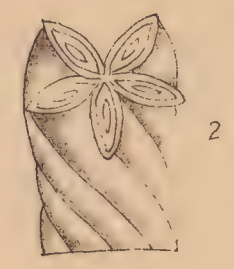
Kleinhovia hospita.

Gyorndon, del.

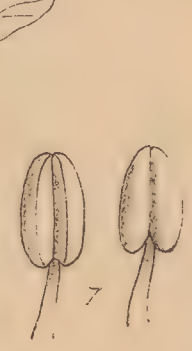
Dunkley Lith.

Sterculiaceæ.





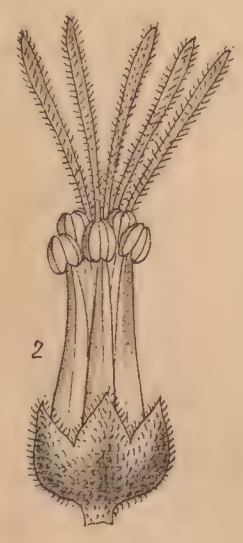
Helicteres Isora.

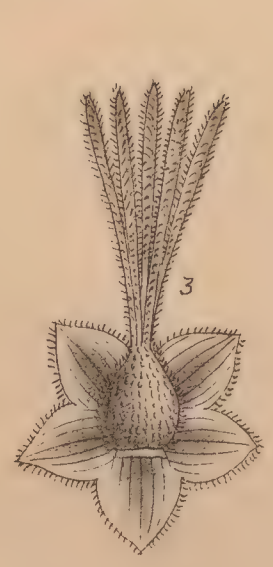


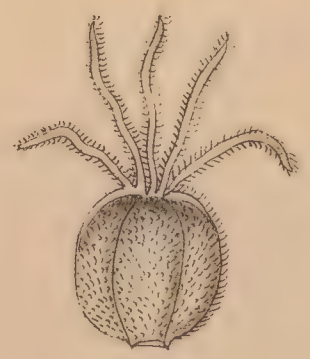
Eriolæna Hookeriana.

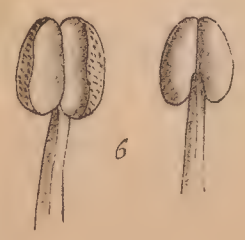
E. quinquelocularis

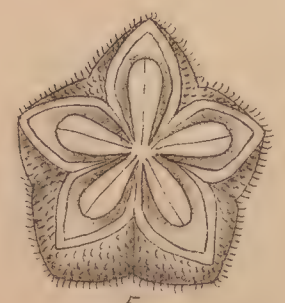
III.





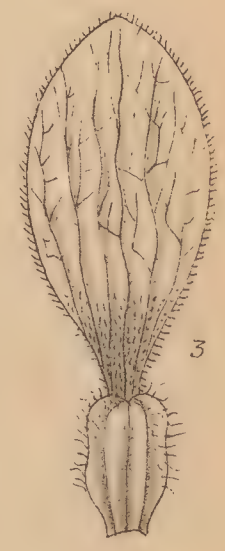


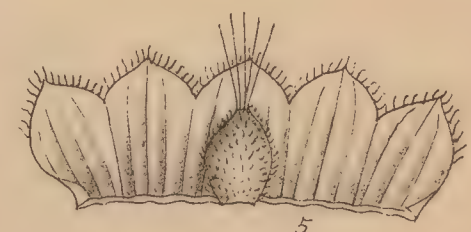


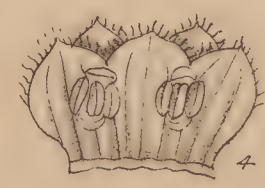


Melochia velutina.

IV







Abroma angusta.

Govindoo, del.

Dumphay. Lith.

GERANIALES.

ORDER XVIII.—LINEÆ.

Flowers regular, hermathrodite. Sepals 5, rarely 4, free or united at the base, imbricate or rarely almost valvate. Petals as many, hypogynous or rarely slightly perigynous, imbricate usually contorted. Stamens as many as petals or twice or rarely thrice as many united into a ring or short tube at the base ; anthers 2-celled, with parallel cells opening longitudinally. Glands 5, adnate to or embedded in the outside of the staminal tube or rarely wanting. Disk none (besides the staminal tube). Ovary free, entire, 3 to 5 celled. Ovules 2 or rarely 1 in each cell, pendulous anatropous, with a ventral raphe. Styles 3 to 5, distinct or more or less united, with terminal usually capitate stigmas. Fruit either a capsule, separating into cocci, usually dehiscent, or a drupe, with as many pyrenes as carpels, or more frequently reduced by abortion to 1. Seeds 1 or 2 in each coccus or pyrene ; testa membranous or almost coriaceous ; albumen fleshy, abundant or thin or entirely wanting. Embryo usually straight, with flat, ovate cotyledons ; radicle superior. Herbs, shrubs, or rarely trees, glabrous or rarely hirsute or tomentose. Leaves alternate or very rarely opposite, simple and entire or slightly serrate. Stipules lateral or within the petiole, sometimes minute or wanting.

Of no importance as a forest order ; the only tree being the Erythroxylon.

The Hugonia mystax, a scandent shrub, and the Linums (or flaxes) are the only other S. India plants belonging to this order.

ERYTHROXYLON.

For Gen. Char. see letter press to Pl. lxxxi.

1. Erythroxylon Indicum, *DC.*—For description see Pl. lxxxi.

ORDER XIX.—GERANIACEÆ.

Flowers usually hermathrodite, regular or irregular. Sepals 5, or rarely fewer, free, or rarely connate at the base, imbricate or valvate in the bud. Petals as many or rarely wanting, hypogynous or slightly perigynous, variously imbricate in the bud. Torus more or less expanded into a disk, often bearing 5 glands alternate with the petals ; and usually protruding into a short axis in the centre of the ovary. Stamens usually twice the number of the petals, 5 of them occasionally without anthers, or rudimentary ; or in irregular flowers, 3 or more without anthers or wanting ; filaments either free and filiform, or dilated or connate at the base ; anthers with 2 parallel cells. Ovary usually 3 to 5 lobed, with as many cells, the carpels adnate to the axis up to the insertion of the ovules, and often produced above that into a beak bearing the style or stigmas ; stigmas as many as cells, either raised on the style or sessile on the carpels, radiating from a connate base or rarely entirely connate. Ovules either 1 in each cell or 2 inserted nearly at the same point, 1 ascending the other pendulous or several in 1 or 2 rows. Fruit either a lobed capsule, lobes 1 seeded, separating from the axis with the seed, and elastically rolled upwards along the beak, leaving the placentiferous portion attached to the axis, or the lobes several seeded, remaining attached to the axis, but opening loculicidally, or, the fruit is a berry or separates into indehiscent cocci. Seeds pendulous or ascending ; testa thin or rarely crustaceous ; albumen usually scanty or none. Embryo straight or curved, radicle short and straight or long and curved or forked over the cotyledons. (Herbs or shrubs, or rarely) trees, leaves opposite or alternate, toothed, lobed, or divided, very rarely quite entire. Stipules usually 2. Peduncles axillary, 1 or 2 flowered, or bearing an umbel of several flowers, very rarely a cyme or raceme.

An order of no importance to the forester ; two species of Averrhoa being the only trees. Of herbaceous plants it contains all the balsams, the Oxalis and Geranium there are no shrubs.

Tribe Oxalideæ. Flowers regular, sepals imbricate, glands none, stigmas capitate, ovules 2-many, leaves compound. Stamens 10, sometimes 5 sterile, styles distinct, ovules many in the cells, fruit indehiscent, trees with pinnate leaves ... ...Averrhoa.

AVERRHOA. Linn.

For Gen. Char. see letter press to Pl. cxvii.

1. Averrhoa Bilimbi, *Linn.*—For description, &c. see Pl. cxvii.

2. Averrhoa Carambola, *Linn.*—A small tree, leaves alternate glabrous or more or less pubescent, leaflets 5 to 11 very obliquely ovate acuminate $1\frac{1}{2}$-2 inches long of a pale or glaucous color on the under side, where they are usually more pubescent, flowers small reddish in axillary sessile panicles of 1-2 inches long or forming rather large panicles at the ends of short branches, sepals about 1 line long glabrous, petals nearly twice as long roundish, the 5 smaller stamens usually very minute and wholly without anthers or occasionally 1 or 2 of them are longer with small barren anthers, fruit oblong acutely angled, seed arillate. *Linn.* ;—*DC.* 1. 689. Tarmara tonga, *Rheede. Mal.* iii. *t.* 43, 44.

Common in a cultivated state all over India, but I have not met with it wild, it is commonly known as the Carambola and is called Kamaranga in Hindoostani, the fruit is eaten and preserved and pickled, the juice is useful in removing iron moulds from linen, the leaves are a good fodder, and with the root and fruit are used medicinally by the natives and the latter is used for dyeing.

ORDER XX.—RUTACEÆ.

Flowers regular and hermathrodite, or rarely unisexual. Calyx usually small, 4 or 5 lobed, or divided into as many distinct imbricate sepals, rarely large, or with fewer or more numerous or valvate lobes. Petals of the same number as sepals, free or rarely cohering, hypogynous or slightly perigynous, imbricate or valvate in the bud. Stamens usually free, either equal in number to the petals and alternate with them, or double the number, or rarely more numerous, when twice as many as petals the sepaline ones (those opposite the sepals) usually longer than the others. Anthers usually versatile, with 2 parallel cells opening longitudinally, the connective occasionally tipped by a gland or projecting appendage. Torus usually more or less thickened into an entire crenate or lobed disk, within the stamens, under or round the ovary. Gynœcium of 4 or 5, rarely more or fewer carpels, more or less united into a single lobed or entire ovary, or rarely quite distinct, with one cell to each carpel. Styles as many as carpels, either free at the base but united upwards, or united from the base ; stigma terminal, entire or lobed. Ovules usually 2 in each cell, superposed or rarely collateral or solitary, or more than 2 ; the micropyle superior. Fruit separating into 2-valved or rarely indehiscent cocci, or the carpels united in an indehiscent berry or drupe, or rarely in a loculicidally dehiscent capsule, the endocarp frequently separating from the pericarp. Seeds usually solitary in each cell, testa crustaceous and often shining, or rarely coriaceous or membranaceous ; albumen fleshy or none. Embryo straight or curved, large in proportion to the seed ; cotyledons flat or rarely folded ; radicle superior. Trees or shrubs, very rarely herbs, marked with glandular pellucid dots on the leaves and other thin herbaceous parts. Indumentum usually stellate, if any. Leaves opposite or alternate, simple or compound, entire or rarely toothed or lobed. Stipules none. Flowers axillary or terminal, solitary, clustered, cymose, or paniculate, very rarely racemose and seldom if ever spicate.

A large order in southern India, but the only trees of any importance are the Feronia (the wood apple) and the Ægle (the bel) both belonging to the tribe *Aurantieæ* to which also belong the Orange, Lime, &c. and other genera, all small trees or shrubs often yielding close grained hard wood suited for the lathe, but always small ; a species of Clausena, a small tree wild on the Anamallays, yields a delicious fruit ; the tribe *Zanthoxyleæ* gives 3 trees, one an Evodia, 1 a Melicope, and 1 a Zanthoxylum, and several shrubs, species of Zanthoxylum ; and the tribe *Toddalieæ* is represented by a small tree, the Acronychia, and thorny shrubs (Toddalia).

Tribe I, Zanthoxyleæ.—Trees or shrubs, leaves pinnate or 3 foliate with opposite leaflets or 1 foliate, the leaflets usually large, ovary lobed, fruit separating into distinct 2 valved cocci. Endocarp persistent or separating elastically, seeds without albumen, cotyledons usually flattened and broader than the radicle.

Leaves opposite and alternate simple, unarmed, stamens 8. ... ...MELICOPE.
Leaves opposite trifoliate (digitate or pinnate) unarmed, stamens 4 ... ...EVODIA.
Leaves alternate trifoliate or pinnate, usually armed, stamens 4. .. ..ZANTHOXYLUM.

Tribe II, Toddalieæ.—Trees or shrubs, with the habit of Zanthoxylum, ovary not lobed, fruit several celled indehiscent (or rarely loculicidally dehiscent) seed albuminous.

Leaves 1 foliate... ... ...ACRONYCHIA.
Leaves 3 foliate... ... ...TODDALIA.

Tribe III, Aurantieæ.—Trees or shrubs, leaves pinnate with usually alternate leaflets, or 1 foliate, or simple ; stamens twice as many as the petals or more, ovary not lobed, fruit indehiscent, seeds without albumen.

* Ovules solitary or twin in the cells.
α. Style very short, not articulate with the ovary persistent.
Calyx 5 parted, stamens 10, free ... .GLYCOSMIS.
β. Style articulate with the ovary deciduous.
† No thorns, leaves pinnate.
Calyx 5 lobed or entire, petals valvate or subvalvate, stamens 10, ovules 2 in each cell superposed, corymbs terminal... ... ...MICROMELUM.
Calyx 5 cleft or parted, petals inbricate, stamens 10, filaments linear subulate, cymes terminal, flowers large. ... ...MURRAYA.
Calyx 4-5 lobed or parted, petals imbricate, stamens 8-10, filaments dilated below, ovules 2 in each cell, flowers small panicled or racemose ... ...CLAUSENA.
†† Thorny, leaves 3 foliate or pinnate or 1 foliate, calyx 4-5 lobed or parted, stamens 8-10, leaves 3-8 foliate ... ...LIMONIA.
Calyx 4-5 lobed or parted, stamens 8-10 free or connate, anthers ovate or cordato-oblong, leaves 1 foliate. ... ...ATALANTIA.
** Cells of the ovary many ovuled, stamens 20-60, ovary many celled, leaves 1 foliate. ... ...CITRUS.
Stamens 10-12, ovary imperfectly 5 6 celled, leaves unequally pinnate. ... ...FERONIA.
Stamens 30-60, ovary 8-many celled, leaves 3 foliate ... ...ÆGLE.

MELICOPE.

Flowers often unisexual by abortion, sepals 4 persistent or caducous imbricate, petals 4 valvate or slightly imbricate with inflexed tips, disk thick entire or 4-8 lobed, stamens 8 inserted on to the disk alternately shorter, ovary of 4 nearly distinct carpels, styles inserted above the middle united immediately or at the summit into one, with a capitate 4 lobed stigma, ovules 2 in each carpel superposed or collateral, cocci distinct spreading 2 valved, endocarp cartilaginous or horny separating, seeds usually solitary, testa crustaceous shining, albumen fleshy, embryo straight or slightly curved with oblong or ovate cotyledons. Trees or shrubs, leaves 1 foliate (or 3 foliate in species not Indian), flowers small in terminal few flowered cymes.

MELICOPE INDICA, *Wight.*—A small tree or sometimes only a shrub, branches glabrous, leaves 1 foliate prominently punctate when young alternate or opposite, ovate or obovate entire obtuse or rounded at the apex or with a short sudden point, glabrous paler

beneath, up to 5 inches long by nearly 3 broad, petioles ½-1¾ inches long jointed at their insertion with the leaf, cymes axillary glabrous longer than the petioles 2-3 flowered, pedicels pubescent very short, flowers about 3 lines long, calyx segments imbricate pubescent on the outside, petals imbricate pubescent in a line down the middle of the back, ovary hirsute, fruit cocci distinct (2 coming to maturity) 5-6 lines long coriaceous transversely wrinkled 1 seeded, seeds shining black. *Wight Icones, tab.* 1051.

A small tree or occasionally only a large shrub common on the higher ranges of the Nilgiris towards the Western and S. Western slopes. This genus only differs from Evodia in having 8 stamens instead of 4. (i. e. double the number of the petals instead of the same number) and many botanists would unite them as T. Müller has already done, and both might be united with Zanthoxylum. Wight gives a good figure of this tree, but describes the leaves as simple instead of 1-foliate.

Analysis of Genera, Pl. VI, fig. 1.

MELICOPE INDICA.

1. A full flower showing the imbricate petals.
2. The same, petals removed, showing the 10 stamens alternately shorter, and the very hairy ovary consisting of 4 carpels, but so united as to look like one.
3. Anther front and back view.
4. The 4 carpels opened out with dissecting knife.
5. Transverse section of the ovary showing the ovules.
6. Vertical section of the same showing the 2 superimposed ovules in each cell.
7. Fruit showing the 2 glandular cocci dehiscing (2 carpels having aborted).
8. Section of the seed showing the embryo lying in albumen.

All drawn from fresh specimens collected on the Nilgiris.

EVODIA. FORST.

Gen. Char. Flowers more or less unisexual. Sepals 4 or 5 imbricate. Petals 4 or 5, valvate or very slightly imbricate. Disk sinuate. Stamens 4 or 5 ; filaments subulate or slightly dilated. Ovary of 4 or 5 carpels, usually distinct and style-like in the male flowers, more or less united in the female, styles attached below the middle, more or less united with a 4 or 5 lobed stigma. Ovules 2 in each carpel, collateral or superposed. Fruit separating more or less completely into coriaceous 2 valved cocci, the endocarp separating elastically. Seeds with a crustaceous testa, usually smooth and shining ; albumen fleshy ; embryo straight with ovate cotyledons. Unarmed trees or shrubs. Leaves opposite, usually digitately 3 foliate or pinnate, rarely 1 foliolate or simple, leaflets entire, often large. Cymes or panicles axillary or rarely terminal. Flowers small.—Boymia, *Juss.* Philagonia, *Bl.* Megabotrya, *Hance.* Petradium, *Lour.*

1. EVODIA TRIPHYLLA, *L.*—A tree, the tender parts tomentose, leaves opposite trifoliate, leaflets elliptic lanceolate acuminate generally very unequal at the base, glabrous on both sides in age and shining above, pale beneath, when young puberulous beneath especially on the veins, generally 4-5 inches long by about 2 broad but exceptionally up to 8-10 inches long and broad in proportion ; petioles 3-6 inches or more long, more or less puberulous, petiolules very short, panicles axillary from shorter to a little longer than the petioles, puberulous dichotomously brachiate, flowers numerous minute tetramerous white inodorous, bractes triangular solitary below the divisions of the panicle, calyx puberulous, petals 4 times as long as the divisions of the calyx, carpels of the ovary woody, styles united, as long as the ovary, stigmas 4 large, fruit &c. as in the genus, seeds black shining.—Fagara triphylla, *L. Sp. Pl. ed.* ;—*Willd.* 1. 666 ;—*Roxb. Fl. Ind.* i. *p.* 416. Zanthoxylon triphyllum, *Wight Ic. tab.* 204.

A tree found throughout our western forests, very common in the Wynad ; in Ceylon there is a variety with digitately 5 foliate leaves. Wight's figure is characteristic of the Indian plant ; the timber is said to be very strong.

Analysis of Genera, Pl. VI, fig. 3.

EVODIA TRIPHYLLA.

1. Female flower, the 4 imbricate petals removed.
2. Male flower, petals removed showing the abortive 4 lobed ovary.
3. Transverse section of the fertile ovary.
4. Back view of a fruit burst, showing 3 two valved coriaceous cocci (the 4th carpel having aborted)
5. Front view of the same showing the 3 seeds (solitary in each of the cocci, one ovule having aborted) sticking to the valves.

ZANTHOXYLUM. LINN.

Gen. Char. Flowers more or less unisexual. Calyx 3, 4 or 5 lobed. Petals 3, 4 or 5, imbricate or rarely valvate or wanting. Disk small or obsolete. Stamens in the males 3, 4 or 5, the ovary rudimentary or conical, or of 3, 4 or 5 distinct style-like carpels. Female flowers without stamens or with scale-like staminodia. Ovary of 1 to 5 distinct carpels, styles nearly terminal, distinct or united upwards ; ovules 2 in each carpel, usually collateral. Fruit of 1 to 5 distinct cocci, dry or drupaceous, usually 2 valved ; the endocarp separating or adherent. Seeds with a hard or crustaceous shining testa ; albumen fleshy, embryo straight or curved, with broad flat cotyledons. Shrubs or trees, often armed with scattered prickles and sometimes climbing. Leaves alternate, usually pinnate. Flowers small, in axillary or terminal cymes or panicles.—Blackburnia, *Forst.*

1. ZANTHOXYLUM RHETSA, *Roxb.*—A very large tree, bark corky deeply cracked, branches numerous spreading, prickles very numerous scattered over every part of the tree even on the petioles very sharp incurved, on the old wood they acquire a solid conical base, leaves about the extremities of the branches abruptly pinnate, 12-20 inches long, leaflets opposite 8-16 pairs shortly petioled glabrous entire about semi-ovate from a very unequal base tapering at the apex into a long acumination, 4-6 inches long by

1-1½ broad, panicles terminal and from the exterior axils often dichotomous, bractes minute caducous, flowers very small yellow, filaments shorter than the petals, united, styles thick length of the filaments, fruit round size of a pea much pitted, 1 seeded, seed round shining black. *Roxb. Fl. Ind.* i, 417.

Anamallay forests, and elsewhere in the western forests, mountains of the Northern Circars and Ceylon ; called Rhetsà màn in Teligu and Sessal on the Bombay ghats ; the seeds taste exactly like black pepper ; in Ceylon the tree is called Kattu Kina.

2. ZANTHOXYLUM ALATUM, *Roxb.*—A small tree or large shrub, thorns stipularly very sharp straight or recurved from a strong broad base, leaves alternate unequally pinnate up to 12 inches long, rachis broadly winged between the leaflets, leaflets about 4-6 pair with an odd one subsessile linear lanceolate gradually acute at the apex and attenuated and unequal sided at the base, serrate crenulate or sub-entire 3½ inches long by one broad, in age smooth on both sides and furnished with pellucid dots, racemes axillary often compound shorter than the leaves, flowers minute pale yellow, calyx 6-8-cleft, divisions acute, petals 0 : in the male, stamens 6-8 much longer than the calyx, rudimentary ovary of 2-3 style like abortive carpels, in the female stamens 0, ovary 3-4 rarely 5 carpels, 1 celled, cells 2 ovuled, ovules attached to the top of the axis, fruit carpels 1-3 come to maturity roundish reniform or ovate size of a pea much pitted or wrinkled, seed 1 shining black. *Roxb. Fl. Ind.* iii. 768.

A small tree or large shrub not uncommon on the mountains in the Vizagapatam and Ganjam districts, but I have not seen it to the south except in cultivation in gardens ; it is common in Bengal ; the seeds are used medicinally.

3. ZANTHOXYLUM SEPIARIUM, *Wight* ; and 4. ZANTHOXYLUM OVALIFOLIUM, *Wight* (*Ill. p.* 169), are small rigid shrubs not uncommon throughout our western ghats, and scarcely differ except that the former is thorny and the latter unarmed.

5. ZANTHOXYLUM TETRASPERMUM, *WA.* ; *Thw. En. Pl. Zey. p.* 69, is a very large thorny creeper common in nearly all the moist forests of the western ghats up to 5,000 feet, and in Ceylon—(leaflets 2-4 pair with an odd one, inflorescence glandularly pubescent).

Analysis, Pl. VI, fig. 3.

ZANTHOXYLUM OVALIFOLIUM.

1. A male flower showing the imbricate petals.
2. The same, petals removed, showing the 4 stamens and the abortive ovary.
3. A petal.
4. Stamens, back and front view.
5. Abortive ovary showing glandular disk at its base.
6. Zanthoxylum Rhetsa, 1 pair of leaflets from the centre of the pinnate leaf.
7. A fruit showing that it consists of a single coriaceous 1-seeded coccus.

ACRONYCHIA. FORST.

Gen. Char. Flowers polygamous. Calyx 4 lobed. Petals 4, valvate. Torus thick. Stamens 8 ; filaments subulate. Ovary 4-celled ; style terminal, stigma entire or obscurely 4 lobed, ovules 2 in each cell, superposed. Fruit 4 celled, usually succulent with a coriaceous or hard endocarp opening loculicidally or drupaceous and indehiscent. Seeds usually solitary in each cell with a crustaceous black testa ; albumen fleshy ; embryo straight, cotyledons oblong. Trees or shrubs. Leaves opposite or alternate, 1 foliolate. Flowers white or yellowish, in axillary or rarely terminal small panicles or loose cymes.—Cyminosma, *Gærtn.*

ACRONYCHIA PEDUNCULATA, *DC.*—A small or middling sized tree, leaves opposite elliptic lanceolate entire glabrous furnished with minute pellucid dots, 4-5 inches long by 1½-2 broad, petioles 1-1½ inches long, peduncles axillary about the summit of the branches, and terminal, corymbiform, flowers yellowish green.—Cyminosma pedunculata, *DC.* 1. 722. C. Ankœnda, *Gærtn. fr.* 1. 280. Jambolifera, *Vahl. Symb.* 3. *p.* 52. Gela lanceolata, *Lour.* Selas lanceolatum, *Spr. Syst.* 2. *p.* 216. Ximenia ? lanceolata, *DC.* 1. 583 ;—*Rheede Mal.* 5. *t.* 4. 15. Acronychia, *Walps. Rep.* 1. 523.

This tree is most abundant in all our mountain forests on the western side of the Presidency, up to about 5,000 feet elevation, and is also found in Ceylon ; it appears to be in flower and fruit at all seasons, and is worthy of cultivation in gardens.

Analysis, Pl. VI, fig. 4.

ACRONYCHIA PEDUNCULATA.

1. A full flower showing the 10 stamens alternately shorter, and the 4 revolute petals valvate (in bud).
2. A petal removed.
3. Stamens.
4. Ovary cut vertically, showing the 2 superposed ovules in each cell.
5. Ovary cut transversely, showing the 4 cells.
6. A seed cut to show the embryo lying in albumen.
7. Embryo and cotyledons.
8. A young fruit which is a drupe with a fleshy sarcocarp and a hard coriaceous nut inside.

TODDALIA. JUSS.

Gen. Char. Same as Zanthoxylon, but ovary not lobed and fruit indehiscent ; petals 2-5.

1. TODDALIA ACULEATA, *Pers.*—A thorny shrub sometimes scandent very variable in its foliage, common throughout the Presidency.

2. TODDALIA BILOCULARIS, *WA.*—A very handsome dark green-foliaged small or middling sized unarmed tree, flowers 2 or occasionally 3-merous. *WA. Prod. p.* 149. Dipetalum, *Dalzell.*

Anamallays, 2-4,000 feet in moist forests. Bombay ghats.

Analysis, Pl. VI., fig. 4.

TODDALIA ACULEATA.

1. A male flower, showing the imbricate petals.
2. The same open, showing the 5 equal stamens and abortive ovary.
3. A female flower.
4. Ovary cut transversely, showing the 5 cells.
5. The same cut vertically, showing the 2 superposed ovules in each cell.
6. A young fruit, which is fleshy pitted on the rind, and indehiscent.

1 to 5 are from the small leaved variety, and No. 6 is a life-size fruit of the larger leaved variety [T. floribunda, *Wall.* ; Limonia oligandra, *Dalz.*]

GLYCOSMIS. CORR.

Gen. Char. Calyx 5-cleft, the lobes broadly imbricate. Petals 5, imbricate in the bud. Stamens 10, filaments dilated at the base, anthers often tipped with a small gland. Ovary 3-to 5 or rarely 2-celled ; style very short, thick and persistent, the stigmas scarcely broader, ovules solitary in each cell. Berry succulent or almost dry usually 1-seeded. Seeds with a membranous testa, without albumen ; cotyledons fleshy. Unarmed trees or shrubs, leaves alternate, pinnate, with few alternate leaflets, or 1-foliolate. Flowers small, in axillary or terminal panicles.

GLYCOSMIS PENTAPHYLLA, *Corr.*—A small tree or more commonly a large shrub, leaflets 3-7 rarely 1-foliate, variable in shape but usually more or less lanceolate entire or obsoletely crenulate, 1-9 inches long (usually about 4-5), panicles axillary or terminal from a few lines long to 3-4 inches, 3-many flowered, flowers variable as to size, petals 4-5, filaments filiform or flat on their whole length or flat to nearly the apex and there filiform below the anther, ovary 4-5 celled more or less raised on a gynophore and with the fruit glabrous. *Correa de Serra Ann. de Mus. tom.* vi. 384. Glycosmis pentaphylla, arborea, nitida, triphylla, angustifolia, and chylocarpa, *of WA. Prod. p.* 92 *and* 93. Limonia, *Roxb. Fl. Ind.* ii. 381.

A most variable plant, generally only a shrub, but sometimes a small tree, common throughout every part of India, Birmah, and Ceylon, and extending to the Straits, China, Australia and the Philippines; it ascends the mountains to 5,000 feet, but is most abundant in the jungles in the plains. Professor Oliver has united all the 6 species described in *Wight and Arnott's Prodromus*, and *Wight's Ill.*, but he makes several varieties; these however run one into another. A form, which I take to be Thwaites's G. bilocularis, with the inflorescence extremely reduced and very small leaves, is common in Tinnevelly. The genus differs from all the other Aurantiaceæ in its style being very short and persistent and not articulated with the ovary.

Analysis, Pl. VI, fig. 6.

GLYCOSMIS PENTAPHYLLA.

1. A flower, showing the imbricate petals.
2. The same petals removed, showing the 10 subequal stamens.
3. The same, with the petals and stamens removed, showing the ovary with the short persistent style and 5 stigmas.
4. Anther, front and back view.
5. Ovary cut transversely, showing 5 cells.
6. The same cut vertically, showing the solitary pendulous ovules in each cell.

MICROMELUM. BL.

Gen. Char. Calyx 5-toothed or entire. Petals 5, valvate in the bud, or nearly so. Stamens 10, filaments linear subulate. Ovary 2 to 6, usually 5-celled, the dissepiments spirally twisted after the flowering ; style deciduous with a small capitate stigma ; ovules 2 in each cell, superposed. Fruit a dry berry. Seeds usually 1 or 2, testa membranous, albumen none ; cotyledons leafy, very much folded. Unarmed trees, leaves alternate, pinnate, with alternate oblique leaflets. Flowers small in terminal corymbose panicles.

MICROMELUM PUBESCENS, *Bl.*—A small tree, young branches, petioles, leaves and inflorescence more or less pubescent, leaves up to 20 inches long, leaflets 9-15 or rarely more, from ovate to broadly lanceolate, gradually acuminate, very oblique at the base, entire or slightly serrulate, sometimes becoming glabrous above, always pubescent beneath, $1\frac{1}{2}$ to 6 inches long by $\frac{1}{2}$ to $2\frac{1}{4}$ broad, petiolules about 2 lines long, corymbs terminal many flowered, flowers very short pedicelled, bractes very minute about 2 lines long, ovary usually hairy, berry size of a large pea yellow ovoid glabrous or pubescent, seed solitary conform to the berry. *Bl. Bijd.* 1. 137. Bergera integerrima, *Roxb. Fl. Ind.* ii. 376. Bergera villosa, *Wall.*

Vary. *α.* leaflets 5, 6 inches long 2-$2\frac{1}{4}$ broad, flowers large.

Vary. *β.* leaflets $1\frac{1}{2}$-$3\frac{1}{2}$ inches long by $\frac{1}{2}$-$1\frac{1}{2}$ broad, flowers small.

The two varieties are very different in appearance. Variety *α*, which has broad large leaflets and much larger and broader flowers, I have only met with on the hills in the Vizagapatam and Ganjam districts, where it grows to be a small tree. Vary. *β*, with

narrow leaves and thin narrow flowers, is found in our western forests and in Ceylon, and also grows to a small tree ; the latter closely resembles Murraya Kœnigii.

Analysis, Pl. VII, fig. 1.

MICROMELUM PUBESCENS.

1. A flower just opening, showing the valvate petals and very shortly lobed calyx.
2. A flower open, showing the 10 stamens alternately shorter.
3. Petal, inside view.
4. The same, outside view.
5. Stamen, front and back view.
6. Flower with the petals and stamens removed, showing the ovary seated on a disk, and the articulated style and stigma.
7. Ovary cut transversely, showing 4 cells, (5 is the normal number, but occasionally 2-7 occur.)
8. Ovary cut vertically, showing two superimposed ovules in each cell.

Drawn from specimens gathered on the Goomsur hills.

MURRAYA. LINN.

Gen. Char. Calyx 5 cleft. Petals 5, narrow, imbricate in the bud. Stamens 10, free ; filaments subulate ; anthers small. Ovary 2 to 5-celled. Style elongated, at length deciduous, stigma capitate. Ovules solitary or 2 in each cell, superposed, or nearly collateral. Berry 1 or 2-seeded. Testa glabrous or woolly ; albumen none ; cotyledons equal, not folded. Unarmed trees or shrubs, leaves pinnate, leaflets alternate, usually oblique at the base. Flowers often rather large, in terminal corymbs, or few together in the upper axils.

1. MURRAYA EXOTICA, *Linn.; Oliv. in. Journ. Linn. Soc. V, Suppl.* 28.—A shrub or small tree, glabrous, or the young branches and petioles pubescent, leaflets usually 5 to 7 from ovate, cuneate-obovate, or almost rhomboidal to ovate-lanceolate, $\frac{3}{4}$ to 2 inches long, coriaceous and shining when full-grown. Flowers white, very fragrant, in compact terminal sessile corymbs, or few together. Petals nearly $\frac{1}{2}$ inch long, erect at the base, spreading in the upper half. Ovary 2-celled. Berry globular or almost ovoid usually 2-seeded. *Wight. Ic. t.* 96.

Vary. *α*. peduncles many flowered.—M. exotica, *WA. Prod. p.* 94.

Vary. *β*. peduncles few flowered, flowers larger.—M. paniculata, *WA. Prod. p.* 94. M. Sumatrana, *WA. Prod. p.* 95.

This is a small tree or large shrub. Variety *α*. is only met with in gardens in this Presidency, but is wild in Bengal and China. Vary. *β* is very common throughout S. India and Ceylon, and it ascends the mountains to over 4,000 feet ; the wood is very close grained and hard, and has been used as a substitute for box ; it is also a very ornamental plant. Dr. Thwaites has found a variety or an allied species at Trincomallee in Ceylon, which he calls M. Glenieii, which only differs in having a 4-5 celled ovary.

2. MURRAYA KONIGII, *Spr.*—A small tree, leaflets alternate 10-20 obliquely lanceolate to ovate acuminate serrate pubescent furnished with numerous glandular dots, panicles corymbiform terminal, flowers small, calyx lobes triangular, ovary 2 celled, ovules solitary or sometimes twin obliquely superposed or almost collateral. *Spr. Syst. Veg.* ii. 315. Bergera Konigii, *DC.;—WA. Prod.* 94 ;—*Roxb. Fl. Ind.* ii. 375.

This small tree, universally known to the natives in this Presidency as the Karepàk, is common in jungles throughout S. India and in Ceylon, and is much cultivated in native gardens ; the whole plant has a most peculiar odour, and the leaves are eaten both fresh and dried in curries ; the leaves, bark, and root are used medicinally by the natives.

Analysis, Pl. VII, fig. 2.

MURRAYA EXOTICA.

1. A full flower.
2. The same, petals removed, showing the 10 subulate filaments alternately shorter.
3. Anther, front and back view.
4. A flower, petals and stamens removed.
5. Ovary cut vertically, showing a solitary ovule in each cell (2 are more usual).
6. A young fruit.

CLAUSENA. BURM.

Gen. Char. Calyx 4 or 5-cleft. Petals 4 or 5, broad, imbricate in the bud. Stamens 8 or 10 ; filaments dilated at the base or in the middle, anthers short. Ovary 4 or 5-celled, or rarely 2 or 3-celled ; style deciduous, with an entire or lobed stigma; ovules 2 in each cell, collateral or superposed. Berry ovoid or oblong or globular, more or less succulent. Seeds with a membranous testa ; no albumen ; cotyledons plano-convex. Unarmed trees or shrubs, leaves pinnate with alternate, usually oblique leaflets. Flower small, usually clustered in terminal or axillary panicles or racemes.—Cookia' *Sonner.*

CLAUSENA WILLDENOVII, *WA.*—A large shrub, branches glabrous or shortly pubescent, leaves $2\frac{1}{4}$-14 inches long, glabrous or more rarely pubescent, leaflets subsessile or on petioles (2-4 lines) long obliquely ovate to ovato-lanceolate, or narrow elliptic lanceolate, from quite rounded at the apex to acuminate, margin crenulate, 2-7 inches long, 1-2 inches broad, flowers in axillary cymose panicles or racemes, pedicels 1-5 lines long, calyx 4-5 parted or lobate, lobes more or less ovate ; filaments 8-10 dilated in the centre subfornicate,

ovary seated on a stalk-like gynophore, globose verrucose with pellucid glands, style thick deciduous about as long as the ovary 4-5 celled, cells 2 ovuled, ovules obliquely superposed or nearly collateral, the funicles arising from nearly the same point on the axis, stigma 4 lobed, fruit more or less succulent size of a pea round or oblong. *WA. Prod. p.* 96 ;—*Oliv. in Aurant. p.* 32. Amyris dentata, *Roxb. Fl. Ind.* ii, 249. (Small form) C. pubescens, *WA. l. c.* 96.

Common throughout the Peninsula and in Ceylon, a most variable plant ; in specimens from the Wynad (3,000 feet), the leaves are narrow, elliptico-lanceolate, very much attenuated at both ends, 7 inches long by 2 broad.

Vary. β. dulcis, Cookia dulcis. Bedd. Mad. Journal, 1861.

This is a tree 30 feet high, with a trunk several feet in girth, bearing a very delicious fruit as large as a large cherry, as succulent as a grape, and somewhat of the flavour of the black currant ; it is called by the Kaders Mor Kurangee ; it is abundant about Toonacodava (elevation 2000-3000 ft.), both in the moist and dry forests, and is in fruit from June till August. Specimens in flower were sent to Prof. Oliver, who pronounces it only a form of Willdenovii, so I will not attempt to separate it, but I believe it quite a distinct species. I have not got specimens at hand available for description, but the leaves and flowers I believe present no tangible characters distinct from Willdenovii ; the former are more membranaceous, highly odoriferous, more prominently dotted and very erose towards the apex. This tree I hope to figure in this work.

2. Clausena Indica, *Dalz.*—A small tree, ramuli puberulous, leaves 6-10 inches long, leaflets 7-11 oblique elliptical to ovato-lanceolate or lanceolate or exactly obovate, $1\frac{1}{4}$-2 inch long subcoriaceous crenulate or entire obtuse or slightly acuminate glabrous or minutely puberulous on the costa, flowers small pentamerous in terminal panicles, pedicels very short, petals oblong or elliptical, filaments dilated below, ovary globose or oblong glabrous, verrucose with pellucid glands, 3 (sometimes 4-5-2) celled, ovules 2 in each cell collateral, fruit 1 seeded spherical pulpy yellow nearly $\frac{1}{2}$ an inch in diameter.—Piptostylis Indica, *Dalz. Kew Misc.* iii. *p.* 33. *tab.* 2. Bergera nitida, *Thw. En. Pl. Zeyl. p.* 46. Clausena Indica, *Oliv. l. c. p.* 36.

A small tree common in the Anamallay (moist forests) up to 5,000 feet, Bombay ghats and Ceylon, probably only a variety of No 1. Professor Oliver thinks it differs from C. Willdenovii in its constantly pentamerous flowers, terminal inflorescence and collateral ovules. The flowers of Willdenovii are very constantly pentamerous, and in dissecting a large quantity of flowers of both species, the ovaries appear to be quite similar, the funicles are always attached at or near the same point, and the ovules are more or less obliquely superposed or nearly collateral ; the inflorescence in Willdenovii is sometimes terminal, and I have specimens intermediate in foliage, which I am uncertain which species to refer to.

The Clausena Wampi (olim, Cookia punctata), a small Chinese fruit tree, is cultivated in gardens.

Analysis, Pl. VII, fig. 3.

Clausena Willdenovii.

1. A flower bud opening, petals very slightly imbricate at their margins or subvalvate.
2. An open flower, showing 10 stamens (8 often occur) alternately slightly shorter.
3. A petal.
4. Stamen, front and back view.
5. A flower, petals and stamens removed, showing the globose ovary papillose with wart like glands and slightly hairy, and the style which is deciduous soon after the petals, and the obsoletely 5 lobed stigma.
6. Ovary cut transversely, showing 5 cells (4 only when the stamens are 8.)
7. Ovary cut vertically, showing 2 superposed ovules in each cell, the funicles arise from nearly the same point above the middle of the axis, and 1 ovule is ascending and the other pendulous, in some ovaries the ovules are nearly quite collateral.

Dissections all taken from fresh specimens gathered at the foot of the Nilgiris.

LIMONIA, Linn.

Calyx 4-5 cleft, petals 4-5, stamens 8-10, filaments free subulate, dilated below, torus elevated forming a short gynophore to the ovary, ovary 4-5 celled, ovules solitary or twin collateral or obliquely superimposed ; style elongated deciduous, stigma obtuse, fruit baccate 4-5 (or by abortion fewer) celled, seeds solitary in each cell, surrounded with mucilage. Trees or shrubs, spinose, leaves 3 foliate or pinnate.

Limonia alata, *WA.*—A small tree, glabrous armed with long nearly straight thorns (1 inch long), leaves trifoliate $2\frac{1}{2}$-$3\frac{1}{2}$ inches long, leaflets cuneate-obovate, quite entire 1-$2\frac{1}{2}$ inches long, petiole winged 1-$1\frac{1}{4}$ inches long, petiolules scarcely any, racemes terminal, calyx 5 lobed, lobes triangular, petals 5 free imbricate, stamens 10 (or 8) subequal, filaments linear subulate, anthers linear oblong, disk small annulate, ovary 5-4 celled, cells 2 ovuled, ovules pendulous collateral or obliquely superimposed, style continuous a little longer than the ovary, stigma capitate, berry globose about 1 inch in diameter, seeds many, cotyledons fleshy equal or subequal. *WA. Prod. p.* 92 ;—*Oliv. l. c. p.* 27.

Common about the jungles at the foot of the Nilgiris and Anamallays, and elsewhere in the western forests of this Presidency and in Ceylon. The wood is hard and strong, and used by the natives for building purposes, &c. and for ploughs.

2. Limonia acidissima, *L.*—A small tree or a shrub armed with straight thorns nearly $\frac{1}{2}$ an inch long, leaves irregularly pinnate with 2-3 pairs of small opposite sessile leaflets and a larger terminal one, all punctate with pellucid dots, oblong retuse crenated, rachis of the leaf broadly winged, flowers small in few flowered generally leafy axillary racemes, calyx 4 cleft or lobate, lobes ovato-rotundate or triangular, petals 4 free oblong or elliptic, stamens 8 free subequal, filaments subulate, anthers cordato-oblong, disk annular

or shortly stipitate, ovary 4 celled, ovules solitary in each cell pendulous, style short thick, stigma obtuse, fruit globose 1-4 seeded. *Linn. Gen. Pl.* 534. Limonia crenulata, *Roxb. Fl. Ind.* ii. *p.* 381. Hesperethusa, *Rœm.*

Very common throughout India and Birmah, but not in Ceylon, it does not ascend the mountains to any elevation, the wood is hard and close grained and adapted for the lathe, the tree is called Tor-elaga in Telugu.

Analysis, Pl. VII, fig. 3.

LIMONIA ALATA.

1. A flower, showing the pubescent calyx-segments slightly imbricate at the base or subvalvate, and the imbricate slightly hairy petals.
2. The same open, showing the 10 subequal stamens.
3. A petal.
4. Anther, front and back view.
5. A flower, petals and stamens removed, showing the ovary seated on an annular disk and the 4 stigmas.
6. The ovary cut vertically, showing the 2 obliquely superimposed ovules attached to nearly the apex of the axis.
7. The same cut transversely (much magnified), shewing the 5 cells.
8. A fruit.
9. A flower bud.

Drawn from fresh specimens gathered at foot of Nilgiris.

ATALANTIA. CORR.

Gen. Char. Calyx 3 to 5-cleft, or at the time of flowering irregularly split to the base. Petals 3 to 5, imbricate in the bud. Stamens twice as many or rarely more, free or irregularly united at the base, anthers ovate or oblong. Ovary 2 to 5-celled ; style deciduous, with a capitate stigma : ovules solitary or 2 in each cell, collateral or rarely superposed. Berry globular, with a thickened rind 1 to 5-seeded. Seeds obovoid or oblong testa membranous, albumen none ; cotyledons flat or convex, more or less fleshy. Shrubs or small trees, unarmed or thorny. Leaves 1-foliate coriaceous. Flowers in axillary clusters or short racemes or small, cymose panicles, occasionally solitary.—Sclerostylis, *Blume.*

ATALANTIA MONOPHYLLA, *Corr.*—A small tree or a shrub, bark greenish, thorns small strong sharp sometimes wanting, leaves ovate or oblong more or less emarginate at the apex, 2-3 inches long by 1-1½ broad, racemes axillary short sessile, calyx at the time of flowering irregularly cleft to the base, margins scariose, stamens 8 (rarely 5-7) joined into a tube free and subulate just at the apex, ovary generally 4, (rarely 3-5) celled, ovules solitary or twin, style at first continuous with the ovary, after flowering deciduous leaving a scar ; berry size of a nutmeg exactly like a very small lime 1-4 seeded. *Corr ;—DC.* 1, 535 ;—*WA. Prod.* 91. A. floribunda, *Wight Ic. tab.* 1611. A. platystigma, *Wight Ill.* 1. 108. L. monophylla, *Linn.* Trichilia spinosa, *Willd. Sp. Pl.* ii. 554 ;—*DC. Prod.* 1. 623.

A small tree common in many parts of our Presidency and in Bengal and Ceylon, in the Northern Circars it is called Arawinim (jungle lime) the wood is very hard and close grained.

2. ATALANTIA RACEMOSA, *WA.*—A shrub or very small tree, thorns large, leaves ovate or oblong more or less emarginate, racemes axillary, flowers subsessile or pedicelled few or dense, flower buds globose, flowers 4-merous (rarely 3-merous), stamens 8, filaments free or joined into a tube almost quite to the apex or irregularly united, ovary 2-3 celled, ovules twin, fruit globose small. *WA. Prod.* 91. Sclerostylis racemosa, parvifolia et ovalifolia, *Wight Ill. p.* 109.

A variable plant much like No. 1, common about our western forests and in Ceylon.

3. ATALANTIA CEYLANICA, *Wight.*—A small tree, glabrous armed or without thorns, leaves ovato-lanceolate oblong or elliptic to rotundate acute or somewhat obtuse and slightly emarginate at the apex, flowers tetramerous axillary or terminal fascicled or racemed, calyx more or less 4 lobed, filaments free or 2, 3 more or less united together, disk annulate subcupulate, stigma clavate, ovary more or less stalked 2 celled, ovules twin.—Scelerostylis Ceylanica, *Wight. Ill. p.* 109. S. Arnottiana, *Wight l. c.* Rissoa Ceylanica, *Arnt. Pug. Pl. Ind. Or.* 6. S. rotundifolia.

Ceylon, up to 4-5,000 feet elevation—Nilgiris ?

4. ATALANTIA MISSIONIS, *Wall.*—A small thorny glabrous tree or shrub, thorns solitary or in pairs, leaves elliptic oblong, about 3 inches long by 1½ broad, petioles ¼ inch long, racemes in the axils of the spines many flowered somewhat capitate much shorter than the leaves, flowers tetramerous (rarely pentamerous), filaments free, ovary 4 (rarely 5) celled, cells 2 ovuled, ovules pendulous collateral. *Oliv. l. c. p.* 25. Limonia Missionis, *Wall. Cat.* 6358 ;—*WA. Prod. p.* 92.

Anamallay hills, 2,000 feet, and elsewhere on western side of the Presidency, Cuddapah and N. Arcot hills and Eastern Ghats, also in Ceylon.

Analysis, Pl. VII, fig 5.

ATALANTIA MONOPHYLLA.

1. A flower, showing the irregularly ruptured calyx.
2. A flower open, showing the 4 petals, and 8 stamens combined into a tube.
3. A petal.

4. Calyx tube open and petals slightly connate round its base.
5. A calyx.
6. Anther, front and back view.
7. A flower, petals and stamen tube removed, showing the ovary seated on an annular disk.
8. Ovary cut transversely, showing its 4 cells.
9. Ovary cut vertically, showing the solitary ovules peltately attached to the centre of the axis.

Drawn from fresh specimens gathered on the Nilgiris.

CITRUS. Linn.

Gen. Char. Calyx 3 to 5-lobed. Petals 4 to 8, thick, imbricate in the bud. Stamens indefinite, usually numerous, filaments flattened at the base and variously connate, anthers oblong. Disk large, cupular or annular. Ovary of 6 or more cells ; style deciduous, with a capitate lobed stigma, ovules 4 to 8 in each cell, in 2 rows. Berry globular or oblong, with a thickened rind, several celled, with thin dissepiments, the cells more or less filled with transverse pulpy cellules. Seeds with a coriaceous testa ; albumen none, embryo often more than one ; cotyledons fleshy, plano-convex. Trees or shrubs, often armed with axillary spines. Leaves 1-foliolate, the petiole often winged. Flowers white, axillary, solitary clustered or shortly paniculate.

The species of this widely cultivated genus are so very variable that they have puzzled all botanists ; all the Indian varieties may be referred to 2 species, viz., *C. decussana*, Linn. (the pomaloe), and *C. aurantium* (the orange,) the lemon, the sweet lemon, the lime, the sweet lime, the citron, and the different oranges, all being considered as varieties of the latter ; they are all in cultivation in this Presidency, and several varieties of the C. aurantium are quite wild in our forests, particularly on the mountains.

Analysis, Pl. VII, fig. 6.

Citrus. sp.

1. A flower bud opening, showing the calyx and 4 imbricate petals.
2. A male flower opened, showing the numerous polyadelphous stamens.
3. A fertile flower, petals and stamens removed, showing the ovary seated in the cup-like disk.
4. A male flower, showing the abortive ovary and the attachment of the stamens, which are usually polyadelphous and mixed with some quite free ones.
5. A bundle of stamens.
6. Anthers, front and back view.
7. Ovary cut vertically, showing the numerous ovules in 2 rows in each cell.
8. The same cut transversely, showing the 9 cells.

Drawn from flowers in spirits, collected from a small tree found in the Gumsoor hill forests ; it is polygamous (some flowers being only male), a very unusual occurrence in this tribe.

FERONIA. Corr.

For Gen. Char. see letter press to plate of this tree.

1. Feronia Elephantum, *Corr.*—For description, &c. see plate. CXXI

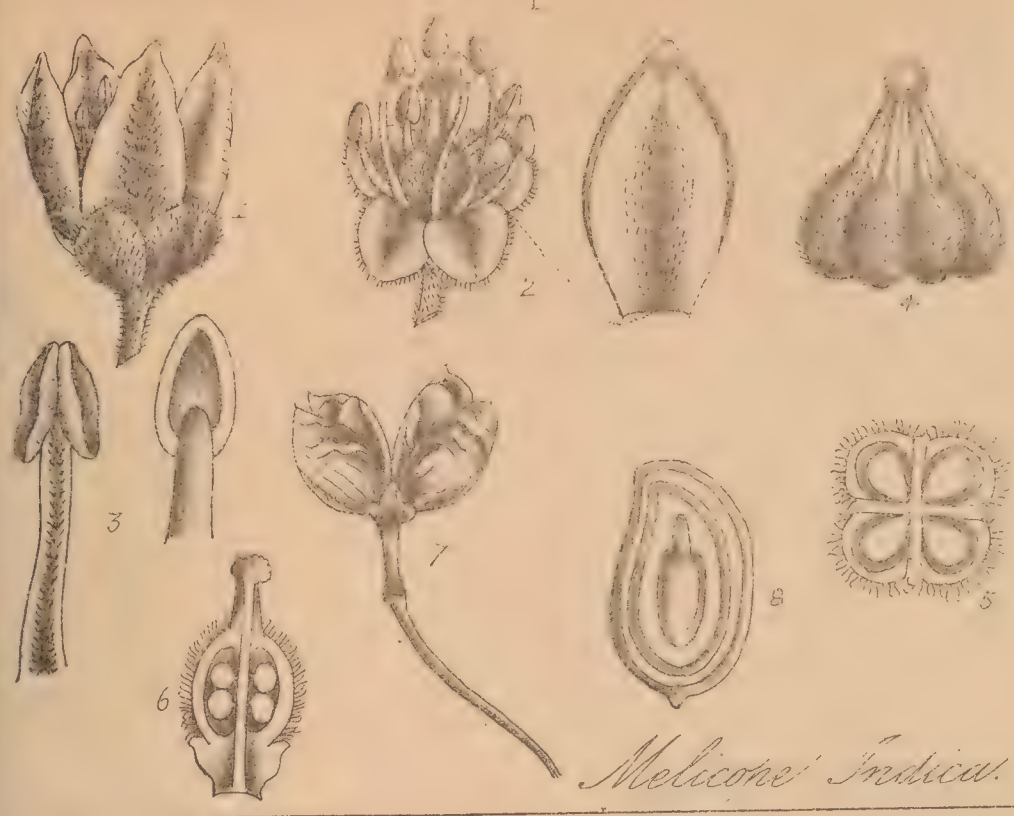
ÆGLE. Corr.

For Gen. Char. see letter press to plate cxxi.

1. Ægle marmelos, *Corr.*—For description, &c., see plate cxxi.

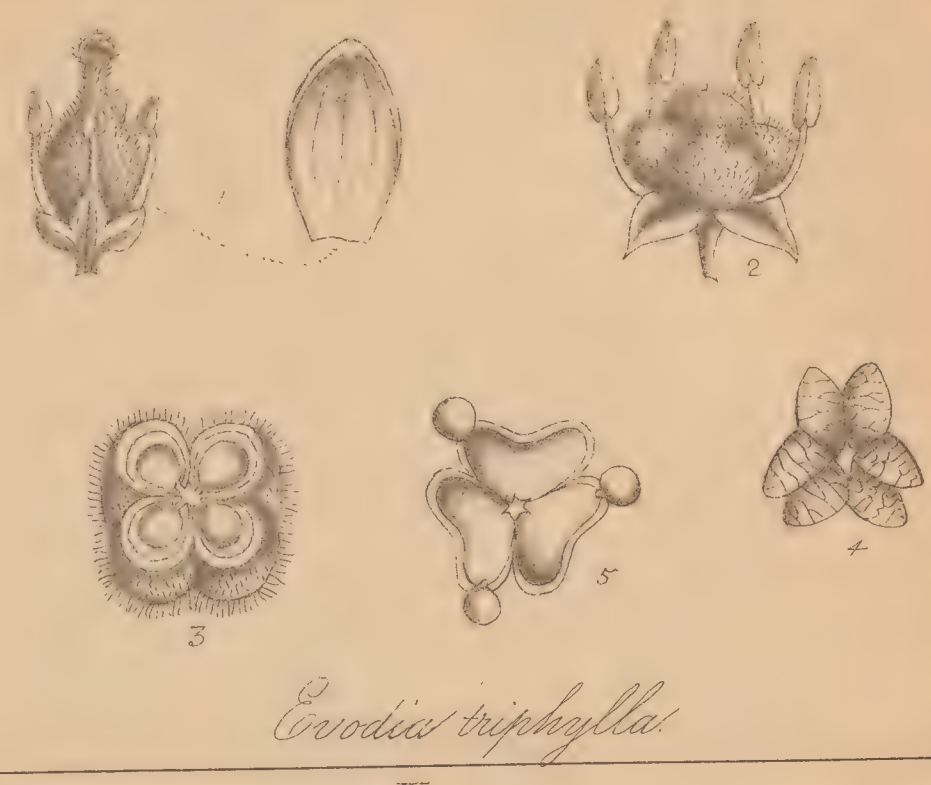
Luvunga.—*A scandent genus is represented in this Presidency by 2 creepers, L. scandens (Ham.) and L. eleutherandra (Dalz.) both being found in the Anamallay forests and elsewhere on the western side of the Presidency, and in Ceylon. Peramignya, also a scandent genus has 2 representatives, P. monophylla (Wight) and P. armata (Thw.) both common throughout our western forests and in Ceylon. Triphasia trifoliata (DC.) a thorny shruba or tree from China, occurs in gardens in Madras, it has 3-foliate leaves, trimerous flowers, 6 free stamens, a deciduous style and solitary ovules.*

I



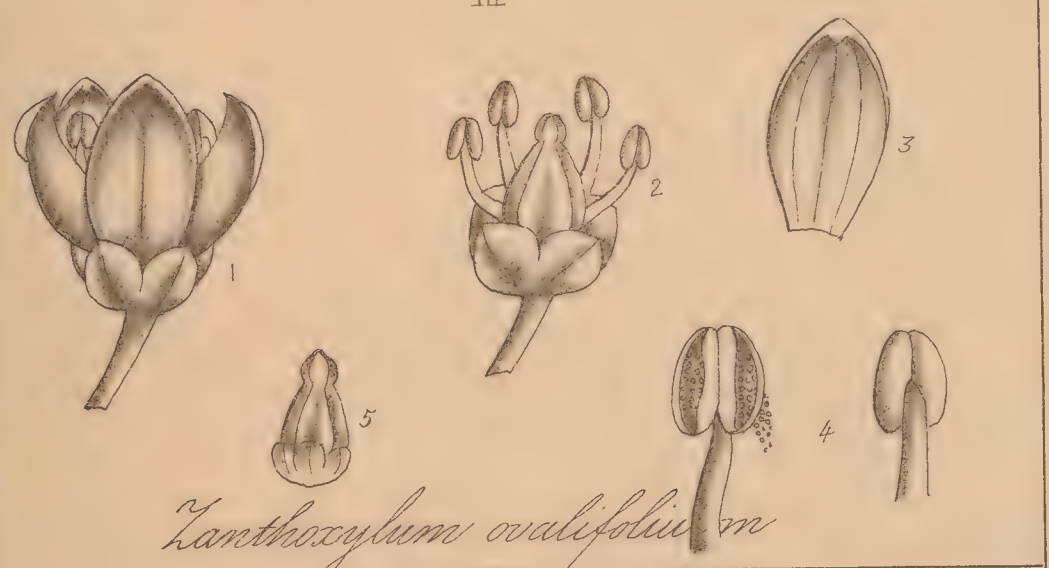
Melicope Indica.

II

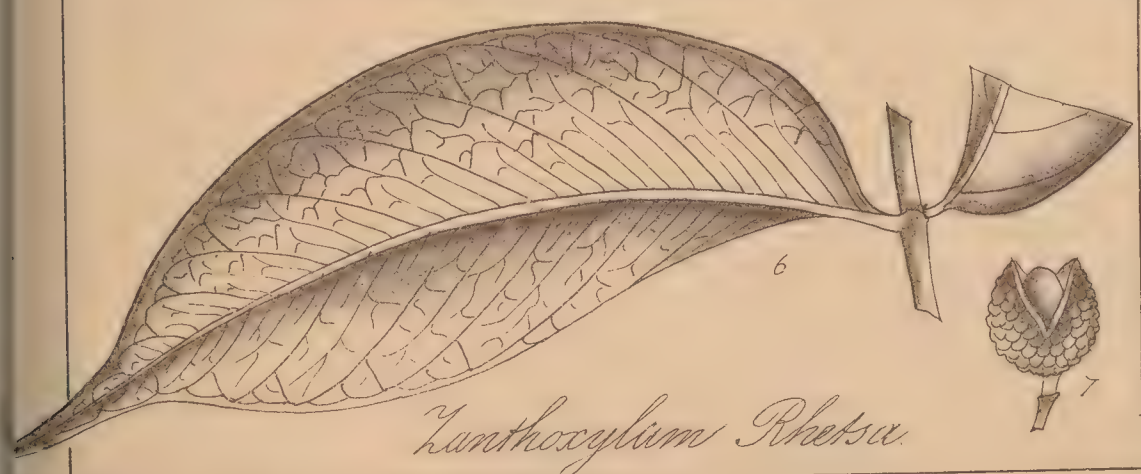


Evodia triphylla.

III

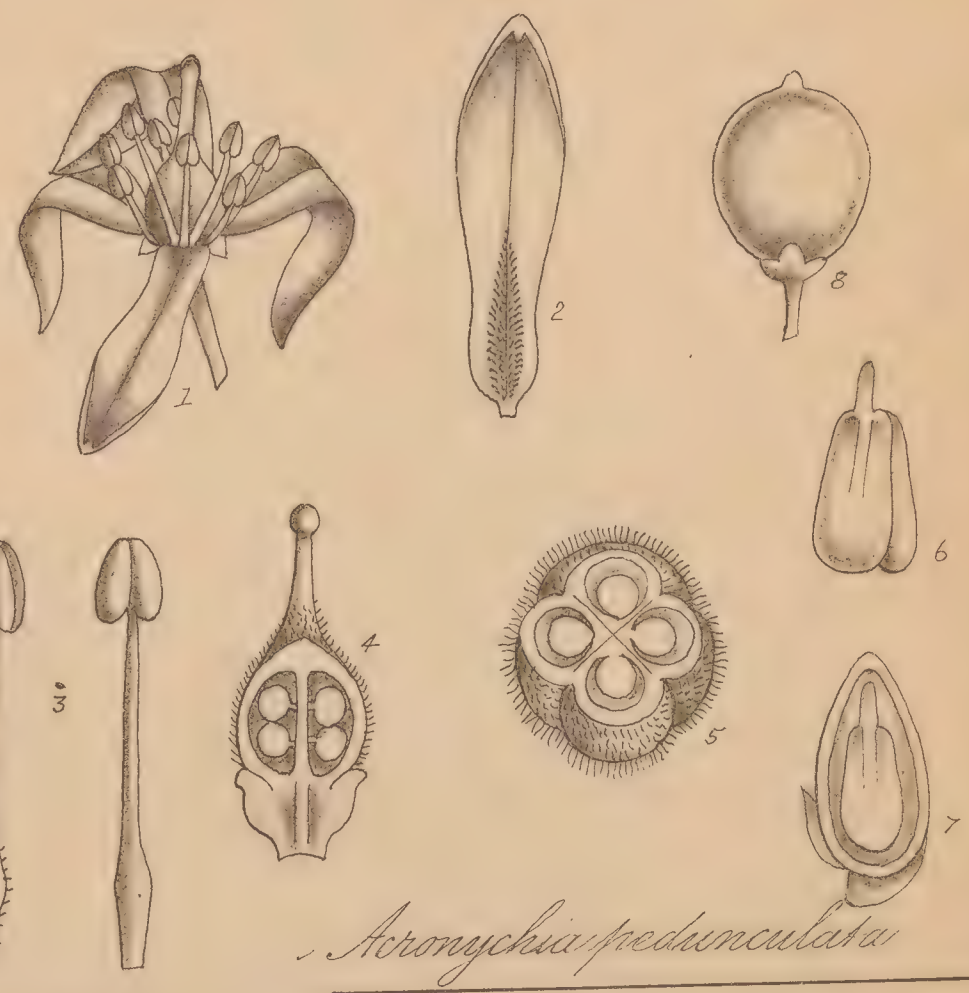


Xanthoxylum ovalifolium

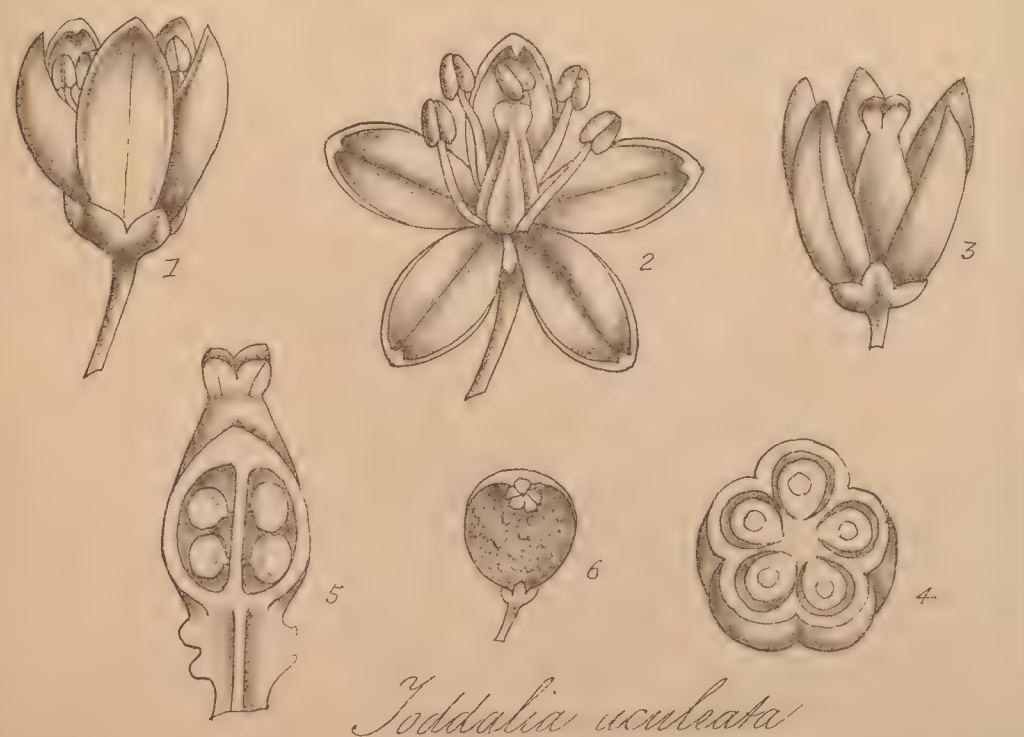


Xanthoxylum Rheesa.

IV



Acronychia pedunculata.



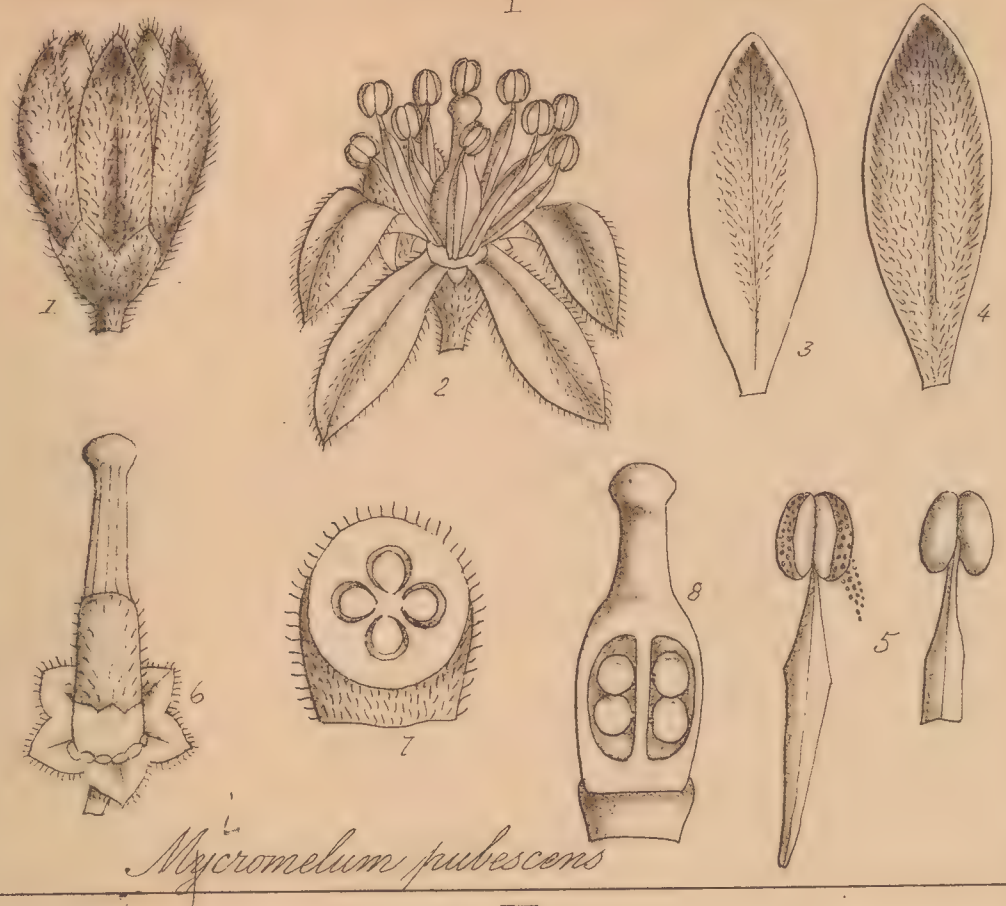
Toddalia aculeata

Glycosmis pentaphylla.

Govindoo, del.

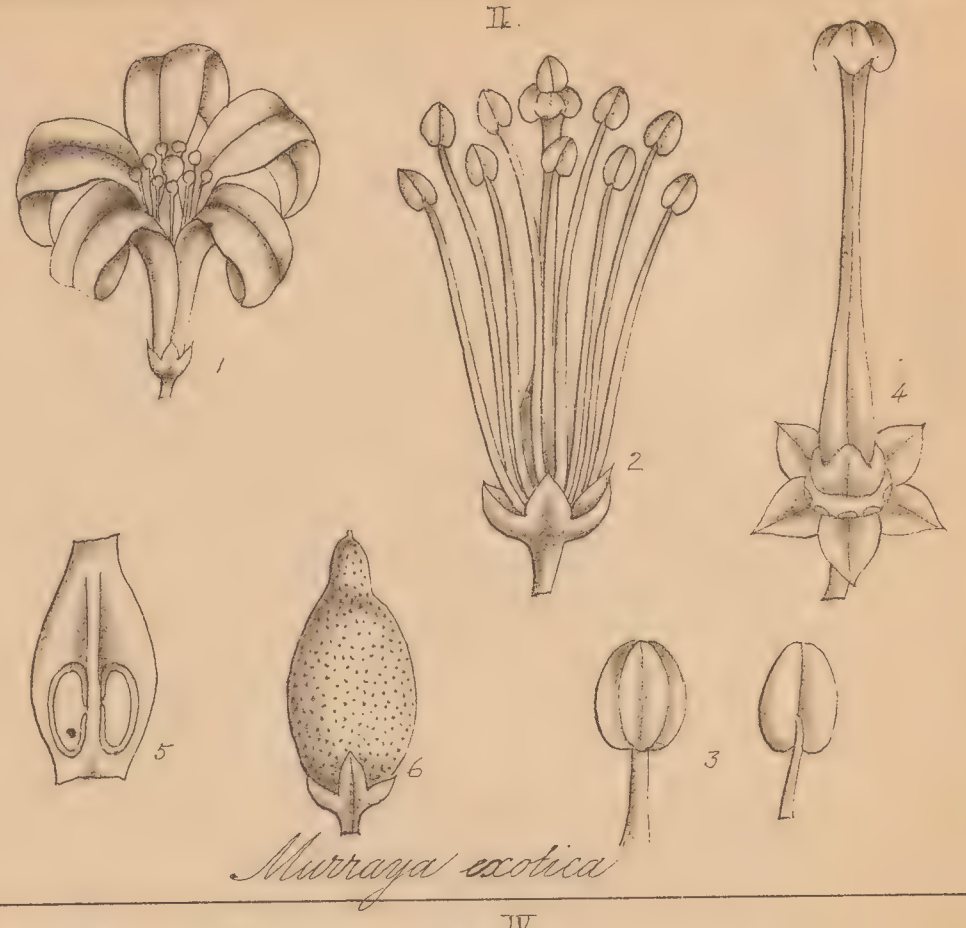
Dumphry, Lith.

I



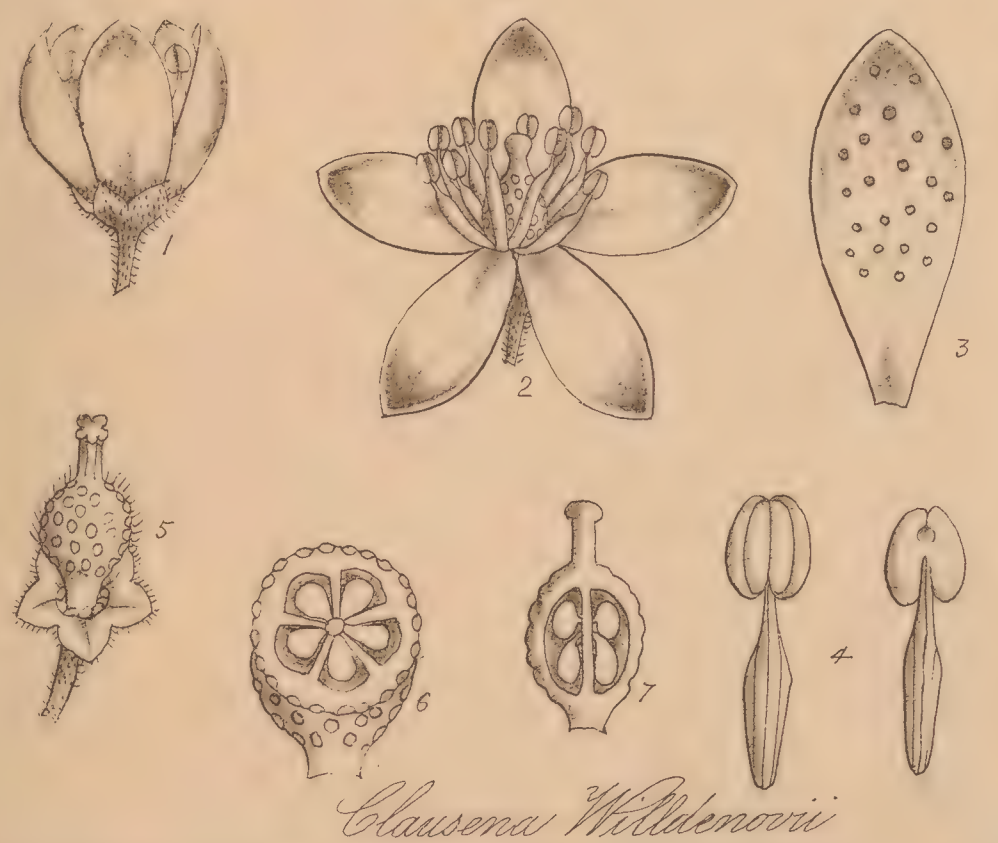
Myxomelum pubescens

II.



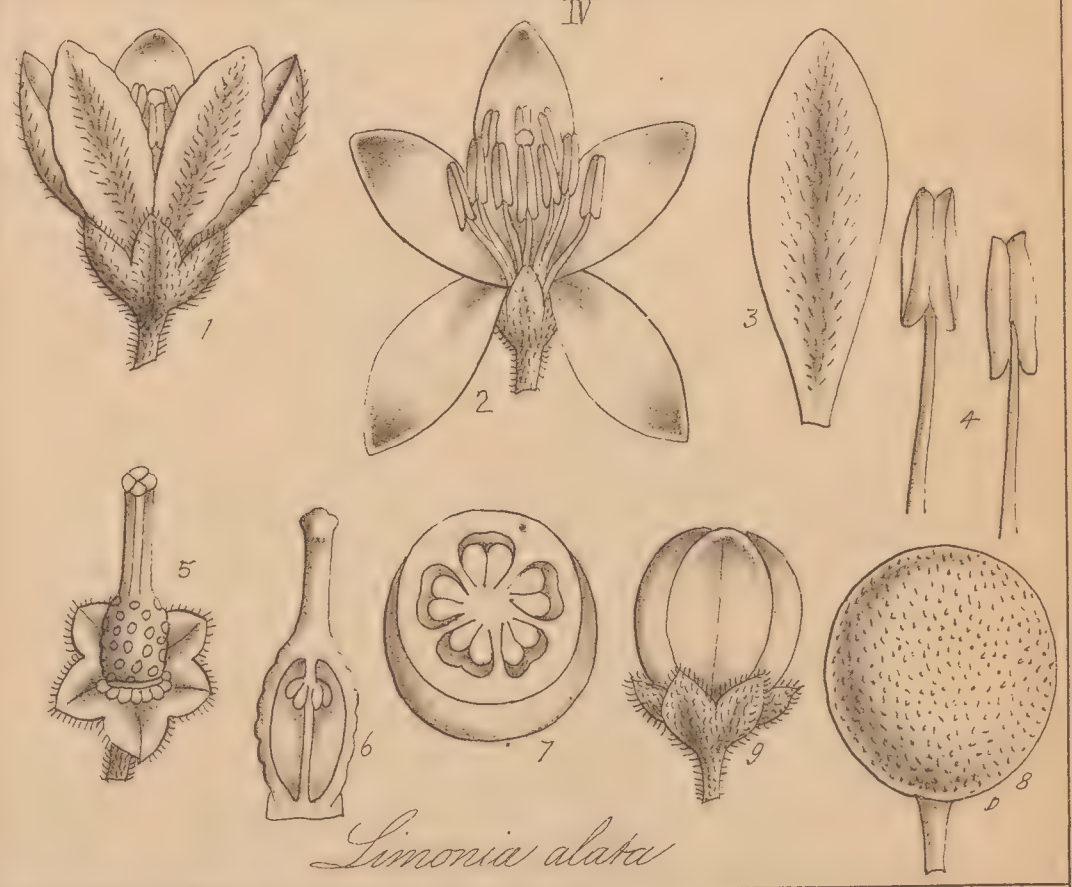
Murraya exotica

III



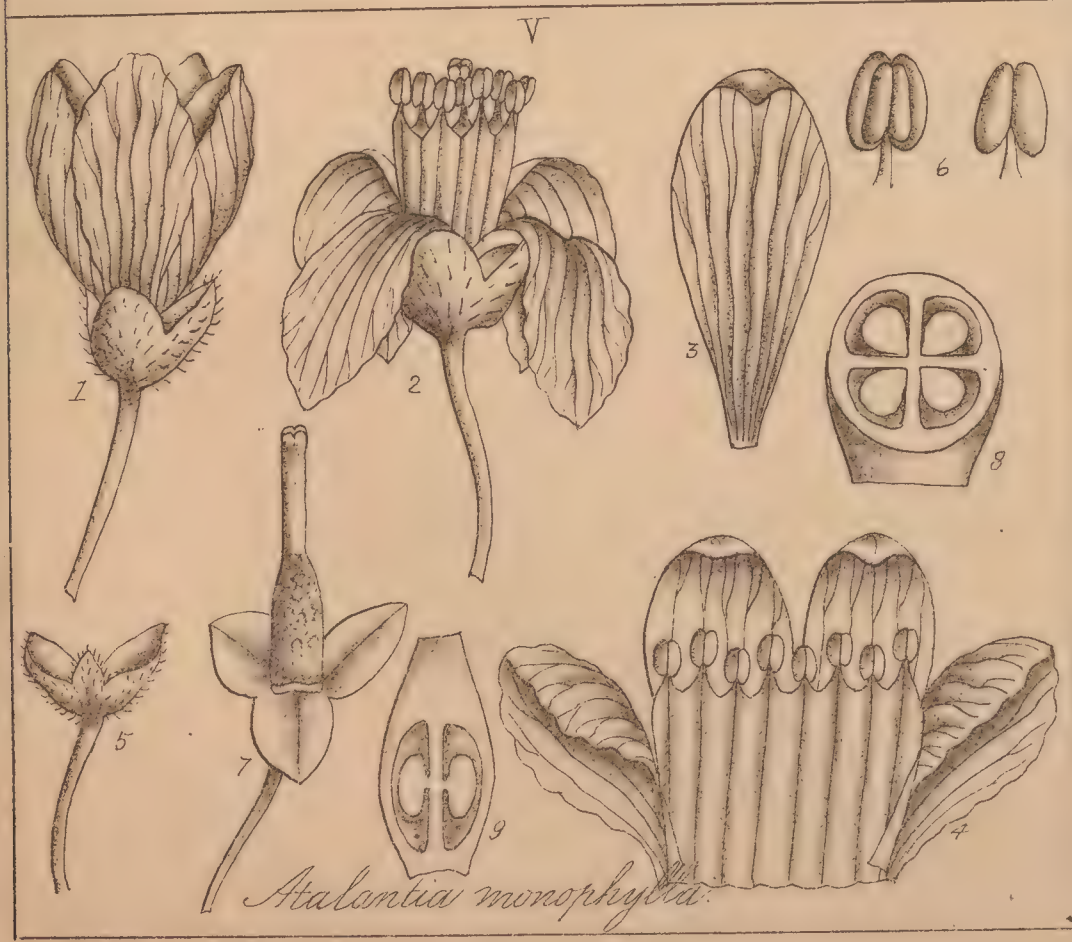
Clausena Willdenovii

IV



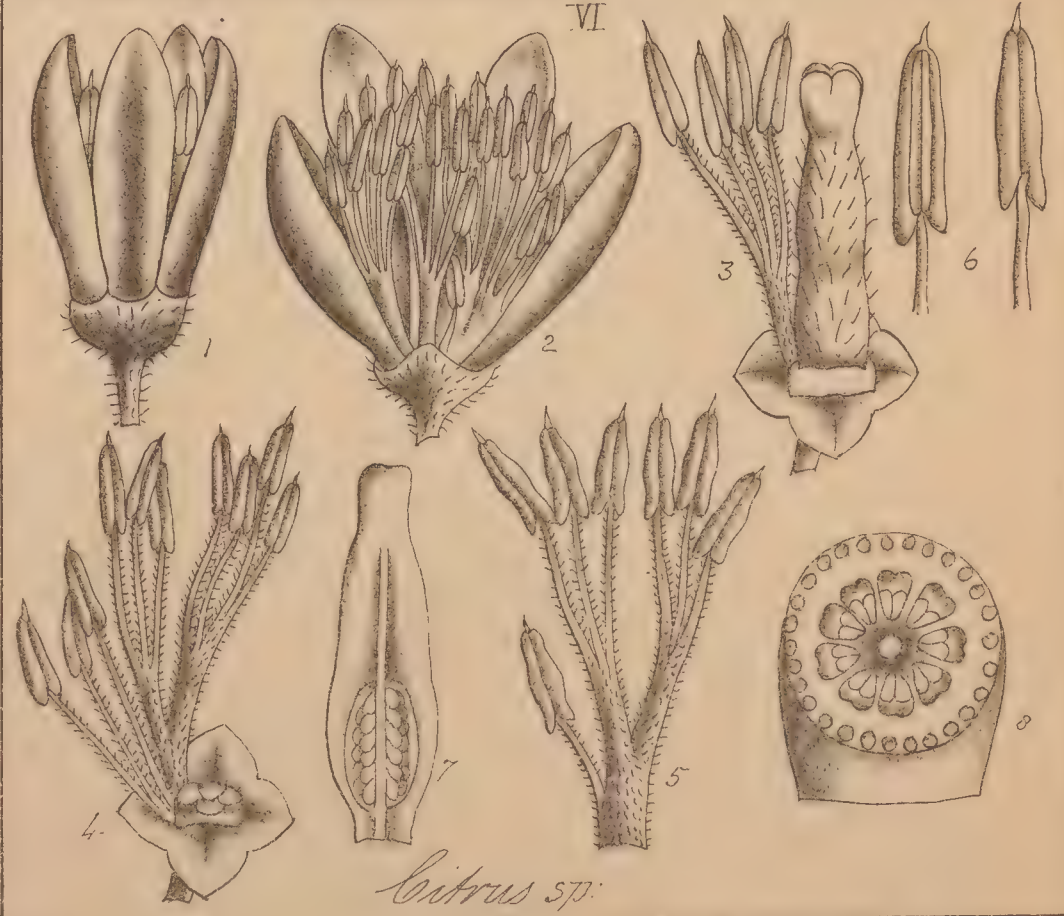
Limonia alata

V



Atalantia monophylla.

VI.



Citrus sp.

Govindoo, del.

Dumphy, Lith.

ORDER XXI.—SIMARUBEÆ.

Gen. Char.: Flowers regular, diœcious or polygamous, more rarely hermaphrodite. Calyx usually small 3 to 5 lobed or divided into as many distinct sepals. Petals 3 to 5, hypogynous or slightly perigynous, imbricate or valvate in the bud, rarely wanting. Stamens either equal in number to the petals, and alternating with them, or double the number, anthers usually versatile, with 2 parallel cells opening longitudinally. Disk annular, cupular or elongated within the stamens under or round the ovary, or rarely none. Gynæcium of 3 to 5, rarely more or fewer carpels, quite distinct, or more or less united into a single lobed or rarely entire ovary, with one cell to each carpel. Styles as many as carpels, united from the base or by the stigmas only, or entirely distinct. Ovules solitary in each cell, or very rarely 2, the micropyle superior. Fruit-carpels either distinct, dry or drupaceous, usually indehiscent, or united in a single drupe or capsule. Seeds usually solitary in each carpel or cell, pendulous; testa membranous; albumen abundant, or little, or none. Embryo straight or curved; cotyledons flat or convex, rarely twisted; radicle superior. Shrubs or trees, with a bitter bark. Indumentum of simple not stellate hairs. Leaves alternate or rarely opposite, pinnate or simple, usually without glandular dots. Stipules none. Flowers usually small, in axillary or rarely terminal panicles or racemes.

Tribe I, SIMARUBEÆ.—Ovary deeply divided, the carpels or lobes entirely distinct or connected by the styles or stigmas.

Leaves pinnate	AILANTHUS.
Leaves simple	SAMADERA.

Tribe II, Picramnieæ.—Ovary entire or rarely shortly lobed, 2-5 celled.

Ovules solitary in the cells, sepals 5, stamens 10, ovary 5 celled ... BALANITES.

AILANTHUS. DESH.

For Gen. Char. see letter press to plate of Ailanthus Malabarica, Pl. cxxii.

1. AILANTHUS MALABARICA, *DC.*—For description, &c. see Pl. cxxii.

2. AILANTHUS EXCELSA, *Roxb.*—A very large tree, leaves abruptly pinnate 1-2 feet long, young ones tomentose, adult glabrous, leaflets 10-14 pair ovate from a very unequal base, coarsely toothed with an inconspicuous gland beneath at the points of the teeth, 2-4 inches long by 1½-2 broad, flowers fascicled in large branched terminal racemes, yellowish about 3 lines in expansion, petals almost glabrous within, filaments glabrous shorter than the anthers, Samaræ linear oblong. *Roxb. Fl. Ind.* 2. 450;—*WA. Prod. p.* 150;—*Wight Illust. tab.* 67.

This large tree is very common throughout the Madras Presidency and in Bombay, but is absent from Ceylon; it is very extensively planted as it grows easily and rapidly from large cuttings, but it is a useless tree, it is bare of leaf for several months, and too brittle to stand much wind, the timber is soft, light, not durable and valueless for ordinary purposes, but catamarans, sword handles and spear sheaths are made of it, the tree is called Pedà màn in Teligu and Peru maram in Tamil.

SAMADERA. GÆRTN.

Gen. Char.: Flowers hermathrodite, calyx small 3-5 parted imbricate, glandulose at the base outside, petals as many as the sepals and alternate with them much imbricate coriaceous, much longer than the calyx, disk large obconical, stamens 6-10 included, furnished with a short hypogynous scale at the base, ovary 4-5 lobed free, styles united into 1, elongate, stigma acute, ovules solitary in the cells, pendulous. Drupes 1-5 (usually fewer than the ovaries from abortion) large, compressed, carinately winged, seed inverse, testa membranaceous, cotyledons plano-convex fleshy, radicle very small. Small glabrous trees, leaves alternate simple, peduncles axillary and terminal elongate, flowers few large.—Niota, *Lam.* Biporeia, *Thouars.* Vittmannia, *Vahl.* Samandura, *Linn.* Manungala, *Blanco.*

1. SAMADERA INDICA, *Gærtn.*—A small tree, leaves oblong elliptical coriaceous shining glabrous except the costa, quite entire, reticulately veined, generally furnished with 2 hollow glands at the base near the insertion of the petiole, and often with several similar ones dispersed over the leaf, 6-8 inches long by 2-3 broad, petioles ½-¾ inch long, peduncles larger than the leaves, axillary or terminal, compressed, pendulous, dilated at the apex and there crowded with the pedicels which are ½-¾ inch long. *Gært. Fruct.* 2. *p.* 352. Niota pentapetala, *Poir*;—*Encycl. Meth.* 4. *p.* 490;—*DC. Prod.* 1. 592. Vittmannia elliptica, *Vahl. Symb.* 3 *p.* 5, *t.* 62 ?—*Rheede Mal.* 6. *t.* 18.

A small tree not uncommon in the Malabar plains on banks of rivers and in Ceylon, where the native name is Samadara, the root and fruit are used medicinally.

Analysis of Genera, Pl. VIII. fig. 1.

1. A young bud showing the very imbricate petals and the glandular calyx.
2. A flower; petals removed showing the 8 stamens.
3. Anther showing the scale at the base of the filaments.
4. Disk, ovary and style.
5. Ovary cut horizontally.
6. A cell cut vertically.
7. Drupe cut horizontally.
8. A seed.

BALANITES. Delile.

Gen. Char.: Flowers hermaphrodite. Sepals 5, with imbricate margins deciduous. Petals as many. Stamens 10; filaments unappendaged; anthers dorsally affixed. Ovary globose, pilose, 5 celled, inserted upon a thick fleshy disk; style simple, terminal. Ovules solitary. Fruit a drupe, 1 seeded, with a bony or crustaceous putamen. Seed exalbuminous; embryo with thick plano-convex, corrugate or 2 lobed cotyledons and a superior radicle. Shrubs or small trees, usually armed, at least when young or stunted, with axillary or supra axillary spines. Leaves 2 foliolate; leaflets entire, coriaceous. Flowers greenish, in axillary fascicles or short racemose cymes. *Oliver Fl. Tropical Africa, p.* 314.

1. Balanites Ægyptiaca, *Delile*; *DC. Prod.* i. 708.—Extremities terete, minutely hoary-puberulous or glabrate; spines various, usually about $\frac{1}{2}$-1 inch: sometimes 3 inches, often wanting on fully grown trees, straight, ascending or patent. Leaflets elliptical or varying from ovate-to obovate-elliptical or rotundate, obtuse or broadly pointed $\frac{1}{2}$ to $1\frac{1}{2}$ inch long, shortly petioluiate; petiole usually much shorter than the leaflets. Ovary soon lengthening out after flowering, narrowed into the style. Drupe edible, with a thick bony putamen; the seed affording an oil. *Oliver. Fl. Trop. Africa, p.* 315. Ximenia Ægyptiaca, *Roxb. Fl. Ind.* ii. 253;—*Wight Ic. t.* 274.

A small tree, 20 feet high or sometimes only a shrub, common in the plains of the Dekkan, in the Central Provinces, the Northern Circars and Bengal. It is called Gari in Teligu and Hingol in Hindustanee, the wood is used for various purposes, but is always small; walking sticks are sometimes made from the tree; the exceedingly hard nut is used to make the firework called àuàr, it is bored, and the kernel extracted, and when filled with gunpowder will go off with a loud report, the leaves and bark are supposed by the natives to have medicinal properties.

Analysis of Genera, Pl. VIII. fig. 2.

1. A bud showing imbricate sepals.
2. A full flower.
3. A petal.
4. A full flower, petals removed.
5. Anthers.
6. Disk, ovary and style.
7. Ovary cut horizontally, showing the 5 cells.
8. The same cut vertically, showing the solitary pendulous ovules.
9. A fruit not full grown.

ORDER XXII.—OCHNACÆE.

TRIBE OCHNEÆ.

Gen. Char.: Flowers regular, hermaphrodite. Sepals 5, free, imbricate, scarious or coriaceous. Petals as many, free, equalling or exceeding the sepals, sub-sessile or unguiculate, contorted or imbricate. Stamens 10 or indefinite; filaments frequently persistent, free. Anthers linear, often elongate or oblong, basifixed, dehiscing longitudinally or by apical pores. Ovary deeply 3-10 lobed, inserted upon a thickened disk enlarging after flowering, each lobe 1 celled, 1 ovulate; style central, filiform or subulate; stigma terminal simple, or style divided at the apex into as many short branches as carpels; stigmas capitellate. Fruit of 3-10 drupes inserted upon the enlarged torus, sessile. Seeds exalbuminous; radicle very small. Trees or shrubs. Leaves alternate, simple, perfectly glabrous, penniveined, stipulate. Flowers in terminal or axillary panicles, racemes or fascicles; usually yellow or orange; pedicels articulated.

Of no importance as a Forest Order, the only two Indian genera being Ochna and Gomphia.

Stamens indefinite, anthers dehiscing by pore-like apical slits or longitudinally. ... Ochna.
Stamens 10, anthers dehiscing by apical pores. ... ... Gomphia.

OCHNA. Schreber.

Gen. Char.: Sepals 5, coloured, imbricate, persistent. Petals 5-12, equalling or slightly exceeding the sepals, deciduous narrowed to the base or unguiculate. Stamens indefinite; filaments filiform; anthers linear or oblong, basifixed, dehiscing longitudinally or by pore-like slits. Ovary deeply 3-12 lobed; lobes 1 celled, 1 ovuled, inserted around a central disk. Styles connate, entire or shortly divided at the apex. Stigmas capitellate. Drupes 3-12 sessile. Trees or shrubs. Leaves alternate, usually serrulate, glabrous, with deciduous stipules. Flowers yellow, rarely greenish, with articulated pedicels.

1. Ochna squarrosa, *Linn.*—A small tree, leaves from narrow-oblong to oblong-ovate or obovate obtuse or mucronate or acute or acuminate serrate, 6-7 inches long by about 2 inches broad, flowers yellow $1\frac{1}{4}$ to $1\frac{1}{2}$ inches in expansion racemose from the apex of very short lateral almost or quite leafless shoots, pedicels elongated, sepals oval obtuse, petals and ovaries 5-12, stigma capitate 3 lobed anthers linear elongate. *Linn. Sp. p.* 781;—*Wight Ill. tab.* 69. Ochna obtusata, *DC. Prod.* 1. 735. Ochna lucida, *Linn.* Ochna cordata, *Thw. En. Pl. Zey. p.* 70.

This tree is very common in the Godavery forests, Kurnool and Cuddapah hills, and many other localities throughout the Presidency and in Ceylon. In Teligu it is called Sunari, and Narole in Canarese; it yields a pretty reddish timber.

Analysis of Genera, Pl. VIII, fig. 3.

1. A bud showing the imbricate sepals.
2. A full flower.
3. The same, petals removed, showing the position of the numerous stamens on the disk, and the lobed ovary and the style.
4. An anther.

5. Young fruit, showing the filaments still adhering to the disk, the anthers having fallen.
6. Ovary cut vertically.
7. Young drupe cut vertically.
8. The same cut horizontally.

2. Ochna Wightiana, *Wall.*—A small tree or large shrub, leaves (on petioles 1 line long) ovate bluntish rounded at the base conspicuously veined very slightly serrate, 1-2 inches long by $\frac{1}{2}$-$\frac{3}{4}$ inch broad, pedicels 4-7 lines long articulated near the middle. solitary or in pairs from the apex of a very short leafless shoot, flowers 4 lines long yellow, sepals oval obtuse petals, and ovaries 5, styles deeply 5 parted at the apex. *WA. Prod.* 152. Ochna Heyneana, *WA. l. c.* Ochna Walkerii, *Planchon Hook. Lond. Journ. of Bot.* v. 653.

A not uncommon shrub or small tree, in many localities throughout the Presidency and in Ceylon.

3. Ochna Moonii, *Thw.*; and 4. O. rufescens, *Thw.*—Are shrubs or small trees inhabiting Ceylon; they are both nearly allied to each other and to squarrosa, but rufescens has very much smaller flowers.

GOMPHIA. Schreb.

Gen. Char.: Character of Ochna, but stamens 10 only instead of indefinite, anthers elongate rugulose opening by terminal extrorse pores, lobes of the ovary usually 5, style simple. Trees or shrubs perfectly glabrous, leaves as in Ochna.—Ouratea, *Aubl.* Philomeda, *Noronha.* Walkera (in part), *DC.* 1. 737. Wolkensteinia, *Regal Garten. Fl.* xiv. 131. 471.

1. Gomphia angustifolia, *Vahl.*—A tree, leaves elliptic-oblong, acuminate at both ends, sharply but slightly serrated shining, about 5-6 inches long by $1\frac{1}{2}$ broad, racemes compound, sepals broadly oval shorter than the petals, carpels obovate-reniform. *Vahl. Symb.* 2. *p.* 49;—*WA. Prod. p.* 152. G. Zeylanica, *DC.* 1. 736. Ochna Malabarica, *DC. l. c.*

A tree, attaining 30 feet in height, common in the western forests of the Madras Presidency and in Ceylon, up to an elevation of 3,000 feet; called Botkæra by the Cinghalese. The wood is hard, and useful for building purposes.

Analysis of Genera, Pl. VIII, fig. 4.

1. A full flower, showing the 10 stamens.
2. The same, petals removed, showing position of the single row of 10 stamens.
3. Anthers.
4. Young fruit.
5. Ovary cut vertically.
6. Young drupe cut vertically.
7. The same cut horizontally.

ORDER XXIII.—BURSERACEÆ.

Gen. Char.: Flowers regular, hermaphrodite or polygamous. Calyx usually small, 3 to 5 rarely 7 lobed or divided into as many distinct sepals. Petals 3 to 5 rarely 7 hypogynous or perigynous, imbricate or valvate in the bud. Stamens twice as many as petals, or rarely of the same number, inserted on or around the disk; anthers versatile, with 2 parallel cells opening longitudinally. Disk usually annular or cupular, often adnate to the base of the calyx. Ovary free, 2 to 5 celled, tapering into a single style, with an entire or lobed stigma. Ovules 2 in each cell or rarely solitary, usually pendulous, the micropyle superior. Fruit a drupe, either indehiscent or the epicarp opening in 2 valves, pyrenes 2 to 5, bony or chartaceous, distinct or united. Seeds solitary in each pyrene, pendulous; testa membranous; albumen none. Cotyledons usually membranous, folded or rarely thick and fleshy. Shrubs or trees, often yielding a balsamic fluid. Leaves usually alternate, pinnate, or 3 foliolate, without or rarely with stipules. Flowers small, in racemes or panicles.

* Epicarp valvate, pyrenes adnate to a central axis.
  Calyx 5-7 toothed, petals 5-7 drupe trigonal or 4 gonal. ... ... Boswellia.
** Drupe indehiscent, or 2-5 valved, pyrenes closely cohering.
† Stamens 6-10.
  A thin disk lining the calyx tube. ... ... Garuga.
  Disk very small with 8 gland like crenatures, flowers subsessile. ... ... Balsamodendron.
  Disk thick, fleshy, half as long as the calyx tube and lining it at its base, free above, 4 lobed, flowers long peduncled. ... . Protium.
  Disk annular very thick and fleshy, stamens inserted below the disk or round its margin; or disk none, stamen-tube submembranaceous as long or longer than the calyx ... ... Canarium.
† † Stamens 5.
  Calyx 5 parted, petals 5; stamens on a villous disk. ... ... Filicium.

An order of considerable importance, containing some resin-bearing fragrant trees, though no particularly valuable timber; the black dammer is a gigantic tree very abundant in all the moist western forests of the Madras and Bombay Presidencies up to 4,000 *feet, it is the Canarium strictum of Roxburgh, but no botanist appears ever to have seen the flowers, and I have only procured the male, though I have specimens from several different localities, the structure of the flower differs so much from typical Canarium, that I was much inclined to propose a new genus for this plant. The disk is absent, and the stamens are placed on a long submembranaceous tube, pending the discovery of the female flower it is perhaps better that it should remain in the genus, so I have slightly revised the generic character to receive it, and if the female should only differ from the male in the presence of a fertile ovary, it may I think still remain in the genus thus revised; if a new genus is constituted I would propose the name Kungilium after its native name, which is universally known in the localities where it grows. In Ceylon there are two other species of Canarium, large trees, (Canarium Zeylanicum and C. brunneum), and the Canarium commune, a Java tree, has been introduced into India and Ceylon, and is a rapid growing ornamental tree. Boswellia gives two resin bearing trees, the Boswellia glabra, very abundant in all our dry subalpine forests throughout the Presidency, and the B. thurifera, which is more scarce, and which I have only seen on the eastern side of the Presi-*

dency and in Bengal; Garuga has one species, a large tree with bunches of grape-like-fruit, common in all our dry forests. Balsamodendron, 1 small middling sized fragrant resin bearing tree, rare in the jungles but abundantly in use as a hedge plant throughout the Presidency. Protium (a genus not sufficiently distinct from Balsamodendron) yields 2 middling sized fragrant trees, the P. caudatum, very common both wild and in a planted state, and the P. pubescens, a rare species. Filicium decipiens, a highly ornamental fern-leaved tree with a useful timber is not uncommon in our moist western jungles, it has been introduced into gardens in Calcutta, Madras and Ceylon, and appears to succeed well in the plains, it grows most readily from seed, and its extended cultivation in our parks and gardens is highly desirable as a more ornamental tree does not exist in India.

BOSWELLIA. Roxb.

For Gen. Char. see letter press to plate of B. glabra, Pl. cxxiv.

1. Boswellia glabra, *Roxb.*—For description, &c., see Pl. cxxiv.

2. Boswellia thurifera, *Coleb.*—A middling sized tree, leaves alternate towards the apex of the branches, unequally pinnate about 16 inches long, leaflets about 14 pair opposite or subopposite pubescent when young (as is the common petiole) at length subglabrous except the costa and veins, sessile or subsessile, narrow lanceolate attenuated into a blunt point at the apex always prominently serrated, 2-2¼ inches long by 6-7 lines broad, racemes terminal and from the upper axils rather crowded shorter than the leaves, rather densely villous as are the calyx and corol; flowers whitish. *Coleb in As. Res.* 9. 377 :—*Roxb. Fl. Ind.* ii. 383.

This tree is not uncommon on the mountains in the northern division of this Presidency and in parts of Bengal, but my specimens are not as good as I could wish, it differs from B. glabra in being much more hairy, and in the leaflets being narrower and more serrated; it yields an olibanum or gum resin which is highly fragrant, and burns with a clear light diffusing an agreeable fragrance, it is often burnt in Roman Catholic Churches and is used medicinally by the natives; it is called Luban and Sàlai in Bengal, the timber is used by the natives for various purposes. It flowers early in the hot season.

GARUGA. Roxb.

For Gen. Char. see letter press to Plate No. cviii.

1. Garuga pinnata, *Roxb.*—For description, &c. see Pl. cviii.

BALSAMODENDRON. Kunth.

For Gen. Char. see letter press to Plate cxxvi.

1. Balsamodendron Berryi, *Arnt.*—For description, &c. see Pl. cxxvi.

PROTIUM. WA.

For Gen. Char. see letter press to Pl. cxxv.

1. Protium caudatum, *WA.*—For description, &c. see Pl. cxxv.

2. Protium pubescens, *WA.*—A middling sized tree, much resembling P. caudatum, young branches pubescent, leaflets 2-3 pair with an odd one, sessile or subsessile, ovate shortly acuminate, pubescent on both sides, as is the petiole, about 1¾ inches long by nearly 1 inch broad, panicles and calyx pubescent otherwise the same as in P. caudatum. *WA. Prod. p.* 176.

I have only seen this tree on the slopes of the Annamally hills, it may be a pubescent state of P. caudatum, but (as far as I can make out from my only specimen) the leaves are quite different.

CANARIUM. Linn.

For Gen. Char. see letter press to Pl. cxxvii.

1. Canarium brunneum, *Thw.*—For description, &c. see Plate cxxvii.

2. Canarium Zeylanicum, *Bl.*—A large tree, stipules large oblique rotundate sagittate, soon deciduous, leaflets 5-9 ovate or elliptic acuminate subrotund at the base, entire glabrous, 3-5¾ inches long by 1½-2½ broad, panicles terminal divaricated, flowers 2-3 together almost sessile at the extremity of the ultimate pedicels, before expanding enclosed in their ovate concave silky bracteoles; calyx externally silky. *Bl. Mus. Bot.* 1. 218. Canarium commune, *WA. Prod.* 175. (not *Linn*). Balsamodendron Zeylanicum, *Kunth.*;—*DC. Prod.* ii. 76. Amyris Zeylanica, *Retz.*

This tree is common in the warm moist districts of Ceylon up to 1,500 feet elevation, and is called Kaa-Koona; the resinous balsam which exudes from the trunk is used by the Cinghalese for burning after being mixed with paddy chaff.

3. Canarium strictum, *Roxb.*—For description, &c. see letter press to Pl. cxxviii.

4. Canarium commune, (the Java almond) has been introduced into gardens in Ceylon and the Madras Presidency.

FILICIUM. THW.

For Gen. Char. see letter press to Pl. cxxix.

1. FILICIUM DECIPIENS, *Thw.*—For description, &c. see Pl. cxxix.

Under the name of Icica Wight and Arnot describe in their Peninsula Flora a species of *Bursera*, the *Bursera serrata, Wall*, this is a tree found in Northern India, but it does not occur in the Peninsula.

ORDER XXIV.—MELIACEÆ.

Gen. Char.: Flowers regular, usually hermaphrodite. Calyx small 3-4-5 (rarely 7) lobed, or divided into as many distinct sepals. Petals 3-4 or 5, rarely 7, free or adnate to the staminal tube, imbricate or rarely valvate. Stamens as many or more frequently twice as many, as petals; the filaments except in *Cedreleæ* united in a tube; anthers sessile or shortly stipitate within, or at the summit of the tube; in *Cedreleæ* filaments free. Disk various, often annular or tubular, free within the staminal tube. Ovary free, entire, 3 to 5 celled; style simple; stigma thick disk-shaped or pyramidal. Ovules in each cell 2, or (in *Carapa*, *Swieteniеæ* and the *Cedreleæ*) 4 or more, the micropyle superior. Fruit a capsule, berry, or rarely a drupe, indehiscent, or septicidally or loculicidally dehiscent. Seeds 1 rarely 2, or in *Swieteniеæ* and *Cedreleæ* few in each cell, with a ventral hilum; albumen fleshy or none, embryo flat or nearly so, radicle superior. Trees or shrubs, the wood often coloured and sometimes fragrant, the bark rarely bitter. Leaves alternate or very rarely opposite, simple or more frequently pinnate, the petiole often continuing long to grow out and produce fresh leaflets; leaflets without dots. Flowers paniculate, often small.

A most important order for the Indian Forester; it yields the (Satin wood) Chloroxylon Swietenia; (the Chittagong wood) Chickrassia tabularis; (the Toon or Bastard Chittagong wood) Cedrela Toona; (the Red cedar) Soymida febrifuga; and 3 species of Melia (generally known as Nim trees) all of which are large trees yielding valuable timber; of less valuable trees it contributes 1 species of Mallea, 2 of Dysoxylon, 1 of Sandoricum, 1 of Aglaia, 4 of Amoora, 1 of Lansium, 3 of Walsura, 1 of Heynea, 2 of Beddomea and 1 of Carapa; little is known of the timbers of these latter. Swietenia, the Mahogony, is an introduced tree. Turœa, Nuregamia, Munronia (all in the Tribe Meliеæ) are S. Indian genera only producing small plants.

Tribe I, Meliеæ.—Stamens united into a tube, ovules 2 in each cell, seeds not winged albuminous.

Ovules superposed, drupe with a 1-5 celled bony putamen	MELIA.
Ovules collateral drupe with 5 cartilaginous pyrenes	MALLEA.

Tribe II, Trichilieæ.—Stamens united into a tube, ovules 2 or rarely 1 or (in Carapa) more than 2 in each cell, seeds not winged, without albumen.

* Disk tubular.

Petals valvate, capsule loculicidal	DYSOXYLON.
Petals imbricate, fruit indehiscent...	SANDORICUM.

* * Disk annular or undistinguishable from the thickened base of the ovary.

† Anthers included or nearly included in the stamen tube.

Stamens equal in number to or not twice as many as the petals	AGLAIA.
Stamens twice as many as the petals, berry indehiscent	LANSIUM.
Stamens twice as many as the petals, capsule loculicidally 3-5 valved	AMOORA.

† † Anthers exserted.

α Fruit 1 seeded.

Berry indehiscent, 1 celled 1 seeded...	WALSURA.
Capsule 1 celled dehiscing in 2 valves 1 seeded	HEYNEA.

β. Fruit several seeded.

Anthers 5	BEDDOMEA.
Anthers 8-10	CARAPA.

Tribe Swieteniеæ.—Stamens united into a tube, cells of the ovary many ovuled, capsule 3-5 valved, seeds numerous albuminous or exalbuminous, winged.

Petals 5, stamen tube urceolate 10 toothed, disk annular, seed with a long broad wing above albuminous ...	SWIETENIA.
Petals 5, stamen tube cupular with 10 two toothed lobes, disk broad, seed winged on both sides exalbuminous.	SOYMIDA.
Petals 4 5, stamen tube cylindrical 10 crenated, disk none, seed winged downwards exalbuminous ...	CHICKRASSIA.

Tribe Cedreleæ.—Stamens free inserted on the outside of the disk, ovary cells many ovuled.

Petals erect, stamens 4-6 ovary 5 celled, capsule septifragal	CEDRELA.
Petals patent, stamens 10, ovary 3 celled, capsule loculicidal	CHLOROXYLON.

MELIA. LINN.

For Gen. Char. see letter press to Pl. xii.

1. MELIA COMPOSITA, *Willd.*—For description, &c. see Pl. xii.

2. MELIA AZADIRACHTA, *L.*—For description, &c. see p. 13, Pl. xiii. (printed Pl. xiv. by mistake.)

3. MELIA AZEDARACH, *L.*—For description, &c. see p. 14, Pl. xiv. (printed Pl. xiii.)

MALLEA. A. Juss.

Gen. Char.: Calyx short cupular 5 toothed, petals 5 short patent induplicately valvate, stamen tube entire at the base and connate with the disk deeply 10 cleft upwards, each division sharply bifid and bearing an anther on the inside between the apiculations, anthers 10, erect slightly apiculate, disk cupular; ovary 5 celled, cells 2 ovuled, ovules collateral from above the middle of the axis, style short clavate, stigma hemispherical 5 lobed, drupe 5 lobed with a slightly fleshy epicarp containing 5 bony indehiscent 1-2 seeded pyrenes. Seed reniform angled, pendulous from the middle of the cell, hilum small, testa membranaceous, albumen fleshy, embryo curved, cotyledons oblong, radicle oblong. A small tree, leaves alternate imparipinnate, leaflets opposite entire or deeply serrate, panicles axillary, flowers small.—Cipadessa, *Bl. Bijdr.* 162. Heynichia, *Kunth ?* Ekebergia, *Roxb.* (not *Sparrm.*)

1. Mallea Rothii, *Ad. de Juss.*—A small tree, young parts sericeous, leaves alternate unequally pinnate 6-10 inches long, common petiole puberulous; leaflets 4-6 opposite pair, elliptic oblong from an unequal base the terminal leaflet the largest, grossly serrate on the upper half or towards the apex, slightly hairy on the veins otherwise glabrous, 1-3 inches long by $\frac{1}{2}$-$1\frac{1}{4}$ broad, petiolules about 3 lines long, panicles axillary long peduncled, flowers small whitish inodorous, drupe the size of a small pea, red when ripe and somewhat succulent. *Ad. de Juss in Mem. Mus.* 19. *t.* 13. Ekebergia Indica, *Roxb. Fl. Ind.* ii. 392.

A small tree common throughout the Madras and Bombay Presidencies and in Ceylon; it is only used for fuel. It is called Chend berà and Purudona in Teligu, and Nàl bilà in Hindoostani.

Analysis of Genera, Pl. VIII, fig. 5.

1. A bud, showing the valvate petals.
2. A flower, petals removed, showing the staminal tube.
3. Staminal tube, showing the 10 stamens.
4. Front and back view of a single lobe of the same, showing the slightly apiculate exserted anther seated between the sharp bifid clefts.
5. A flower, petals and staminal tube removed, showing the ovary, disk and style.
6. Ovary cut horizontally.
7. The same cut vertically.
8. A young fruit or drupe.
9. The same forced open, showing the five 1-celled pyrenes.
10. One of the pyrenes removed from within the epicarp.

DYSOXYLON. Bl.

Gen. Char.: Calyx small, 4 or 5-toothed, or divided into 4 or 5 sepals. Petals 4 or 5, free or adnate to the staminal tube spreading at the top. Staminal tube truncate or 8 or 10 toothed; anthers 8 or 10, within the summit. Disk tubular as long as or usually much longer than the ovary. Ovary 3 to 5-celled; style elongated; stigma disklike; ovules 2 in each cell, or rarely solitary. Capsule globular or pear shaped, 1 to 5 celled, opening loculicidally in 2 to 5 thickly coriaceous valves. Seeds with or rarely without an arillus, oblong, with a broad ventral hilum; testa coriaceous; albumen none; cotyledons large. Trees, often fœtid. Leaves pinnate, leaflets opposite or alternate in the same species, entire, often oblique. Panicles axillary, loose, but often small. Flowers not very small. *Bl. Bijdr.* 172;—*Benth. Fl. Aust. p.* 380. Hartighsea, *A. Juss.* Didymocheton, *Bl. l. c.* 177. Goniocheton, *Bl. l. c.* 177. Gaurea, *Roxb.* (not *Linn.*)

1. Dysoxylum macrocarpum, *Bl.*—A large tree, leaflets 4-6 pairs entire glabrous, 5-8 inches long $1\frac{1}{2}$-3 inches broad, petiolules 4 lines long, panicles supra-axillary 3-5 inches long minutely hoary-tomentose, few flowered, pedicels articulated, flowers pale green about 3 lines long, stamens 8, calyx cupuliform slightly 4-emarginate, petals reflexed acute externally minutely tomentose, staminal tube 4 angled, teeth 8 obtuse bifid, disk as long as the rounded pilose ovary, denticulate, fruit reddish, round, about $2\frac{1}{2}$ inches in diameter shortly pedicelled, 4 celled, 4 seeded, seeds polished dark purple. *Bl. Bijdr. p.* 175;—*Thw. En. Pl. Zey. p.* 60. Amoora ficiformis, *Wight. Ill.* 1. 147. Gaurea binectarifera, *Roxb. Cat.* see Pl. cl.

Wynad, Tinnevelly, and western parts of the Madras Presidency in the moist forests of the mountains, also in Ceylon.

2. Dysoxylum, *sp.*—There is an immense undescribed tree of this genus, common in the Anamallay forests, Coorg, &c., at 2-3,000 feet elevation, I hope to figure it shortly, but my specimens are too imperfect at present. It is called Porapà by the Kaders on the Anamallays, and it flowers in January and February. The fruit is quite round, the size of a billiard ball, very hard and roughly tubercled, of a bright yellow when ripe, dehiscent 3-4 seeded, the seeds bluntly 3 sided, attached by their whole inner face to the central placenta, testa reddish brown, cotyledons green.

SANDORICUM. Cav.

Gen. Char.: Calyx cupular; tube adnate to the base of the ovary, limb shortly 5 lobed imbricate, petals 5 free oblong obtuse imbricate, staminal tube cylindric 10 toothed at the apex, anthers 10 included, disk tubulose 5-toothed sheathing the ovary and base of the style, ovary immersed in the base of the calyx, 5 celled, attenuated into a columnar style, style clavate above girt with a thickened ring, stigmas 5 thick erect, apices recurved, ovules 2 in the cells collateral, pendulous from near the apex of the axis, berry superior globose fleshy indehiscent 3-5 celled, cells 1 seeded partitions disappearing at maturity, seeds arillate, arillus parchment-like pulpy on the outside, testa brown polished and spongy, cotyledons very thick collateral, radicle superior. Trees, leaves trifoliate, panicles axillary, fruit acid edible.

1. Sandoricum Indicum, *Cav.*—A small or middling sized tree, bark green smooth, leaves alternate trifoliate about 12 inches long, leaflets ovate entire glabrous above except when young, downy beneath, 5-7 inches long, 3-4 broad, petioles round downy, stipules none, panicles axillary diffuse shorter than the leaves, bracts oblong, flowers numerous small yellow, calyx downy, the staminal tube about 4 times as long as the disk, anthers sessile linear, berry nearly round size of a small orange slightly villous when ripe, yellow, pulp copious fleshy acid and edible. *Cav. diss.* 7. *t.* 202, 203 ;—*Roxb. Fl. Ind.* ii. 392. Trichilia nervosa, *DC.* 1. *p.* 623. Melia Koetjape, *Burm.*

Mysore, and elsewhere in the Madras Presidency, introduced from the Moluccas. This tree will shortly be figured.

AGLAIA. Lour.

Gen. Char.: Flowers polygamous. Calyx 4 or 5 toothed or cleft. Petals 4 or 5, short, connivent, imbricate in the bud. Staminal tube globular or urceolate, entire or shortly toothed ; anthers as many as petals or rarely more, within the summit of the tube. Disk none, or not distinct from the base of the ovary. Ovary 2 or 3 celled, with a short thick style and disk-like stigma ; ovules 1 or 2 in each cell. Fruit coriaceous or almost succulent indehiscent. Seeds 1 or 2, enveloped in a mealy pulp, without any arillus (or arillus sometimes present ?). Trees, either glabrous or clothed with small scurfy scales or rarely with stellate tomentum. Leaves pinnate, with entire leaflets. Flowers very small, nearly globular, in axillary panicles. *Benth. Fl. Aust. p.* 382. Milnea, *Roxb.* Nemedra, *Juss.*

1. Aglaia Roxburghiana, *WA.*—For description, &c., see Pl. cxxx.

The fruit varies in shape, and I cannot distinguish A. apiocarpa, *Thw.*, which I have from Ceylon. I have, I believe, 2 new species, unless this species is a very variable one, a small tree from the foot of the Tinnevelly ghats (Chokampatty) has the leaves only 2-4 inch long, trifoliate or never more than 2 pair of leaflets with an odd one, fruit pear-shaped ; the other, a small shrub from the South Canara plains, leaflets very broadly oval or obovate, flower very small ; all the species of the genus are polygamous, and it is not always easy to procure good specimens and fruit, which are necessary for a careful discrimination of the different species or varieties ; judging from flowers only, all may well be varieties of one species.

AMOORA, Roxb.

Gen. Char.: Flowers polygamous. Calyx 3 to 5 toothed or lobed. Petals 3 to 5, imbricate in the bud, free from the staminal tube. Staminal tube urceolate or nearly globular, truncate or crenate ; anthers within the tube, twice as many as petals or rarely only 7 when there are 4 petals. Disk none, besides the thickened base of the ovary. Ovary 3 to 5-celled or rarely 2-celled, with 1 or 2 superposed ovules in each cell ; style short or long with a disk like stigma. Capsule obovoid or globular, coriaceous or hard, opening loculicidally in 3 to 5 valves (or sometimes indehiscent?). Seeds solitary in each cell, enclosed in a fleshy arillus (or sometimes without an arillus ?) Trees, leaves pinnate, with entire leaflets. Flowers small but usually larger than in Aglaia. *Benth. Fl. Aust.* 1 *p.* 383. Andersonia, *Roxb.* Nimmoia, *Wight.* Oraoma, *Turcz. in Bull. Mosc.* 1858, 1. 411. Monosoma, *Griff. Not.* iv. 502.

1. Amoora Rohituka, *Roxb.*—For description, &c., see Pl. cxxxii.

2. Amoora Lawii, *Wight.*—For description, &c., see Pl. cxxxiii.

3. Amoora cucullata, *Roxb.*—A tree of considerable size, glabrous, bark ash coloured smooth, leaves alternate unequally pinnate, 6 18 inches long, leaflets opposite 2-4 pair, short petioled, obliquely ovate-lanceolate, obtuse unequally divided by the costa, coriaceous entire and smooth on both sides, 3-6 inches long terminal, leaflets often cowled at the base, male and female flowers on separate trees, the male in solitary axillary many flowered drooping panicles, flowers small yellow trimerous, bractes a small obscure scale under each division of the panicle, and 2 pressing the calyx laterally, stamens 6-8 sessile, rudiment of ovary clavate small : the female in axillary 3-6 flowered solitary racemes, stamens 6, ovary 3 sided covered with minute scurfy scales, 3 celled with 2 superposed ovules in each cell attached to the axis, stigma large sessile 3 lobed, lobes somewhat 2 lobed; capsule nearly round of a tough fleshy texture as large as a middling sized apple 3 valved, seed solitary slightly trigonal, $\frac{3}{4}$th covered with a bright orange aril, testa chesnut coloured.—Andersonia cucullata, *Roxb. Fl. Ind.* ii. 213.

This tree is found sparingly throughout the Presidency and in Bengal.

4. Amoora Championii, *Thw.*—A large tree, leaves glabrous abruptly pinnate, leaflets 2-3 pair oblongo-spathulate subcoriaceous, veinless, rounded at the apex, 2-4 inches long by $\frac{3}{4}$-$1\frac{1}{2}$ broad, panicles supra-axillary 2-3 inches long, minutely pilose, flowers octandrous yellowish, about 3 lines long, calyx shortly 4 lobed, petals glabrous acute, staminal tube 8 toothed, teeth bifid obtuse ; fruit pyriform, 1 inch long, cells 1-2 seeded. Dysoxylon Championii, *H. f. et T. MSS.* ;—*Thw. En. Pl. Zey. p.* 61. Amoora, *l. c. p.* 409.

A large tree in the central provinces of Ceylon, up to 4,000 feet.

LANSIUM. Rumph.

For Gen. Char. see letter press to plate of L. Anamallayanum, Pl. cxxxi.

1. Lansium Anamallayanum, *Bedd.*—For description, &c., see Pl. cxxxi.

WALSURA. Roxb.

Gen. Char.: Calyx short 5 cleft imbricate, petals 5 free oblong patent imbricate or subvalvate, staminal tube deeply 8-10 cleft, divisions linear subulate or 2 cleft at the apex, or filaments 8-10 free, anthers 8-10 terminal erect exerted, disk annular fleshy, ovary depressed 2-3 celled immersed in the disk attenuated into a short style, stigma turbinate 2-3 toothed, cells 2 ovuled, ovules collateral, from the middle or above the middle of the axis, pendulous, berry fleshy indehiscent, 1 celled, 1 seeded, seed inverse covered by a fleshy aril, radicle superior. Trees, leaves 1-3 foliate or pinnate, leaflets alternate, panicles axillary or terminal many flowered, flowers small. Benth. and Hook. subdivide the genus into 2, viz. *Euwalsura,* petals imbricate, filaments connate 2 toothed at the apex. *Surwala,* petals subvalvate, filaments free; the S. Indian species belong to the former.

1. Walsura piscidia, *Roxb.*—A small tree, bark ash colored in old trees deeply cracked, leaves alternate petioled trifoliate, or pinnate, leaflets alternate oblong entire frequently emarginate, above smooth shining green, below whitish, 2-3 inches long by 1 broad, stipules none, flowers numerous small of a yellowish white color, in small terminal panicles, bracts minute caducous, petals imbricate, filaments connate into a tube nearly all 2 toothed at the apex but 1-2 generally rounded and entire, berry oblong downy pulpy, 1 celled, 1 seeded, indehiscent.—*Roxb. Fl. Ind.* ii. 388.

A small tree not uncommon in various parts of the Madras Presidency, called Walsura in Tamil and Walursi in Teligu, the wood is considered good by the natives and used for various purposes, the bark is used to intoxicate fish and does not render them, unwholesome.

Analysis of Genera, Pl. VIII., fig. 6.

W. Piscidia.

1. A flower showing the imbricate petals.
2. The same petals removed and showing the stamen tube.
3. A stamen tube opened showing the inner face.
4. Two filaments removed from a stamen tube showing that 1 has a bifid apex and the other an entire rounded apex (in each stamen tube 1 or 2 only of the latter are generally found.)
5. A flower, petals and stamen tube removed, showing the large disk in which the ovary is sunk, the style and large stigma, the latter slightly bifid at the apex.
6. The same cut vertically showing the attachment of the ovules.
7. The ovary cut horizontally showing the 2 cells and 2 collateral ovules in each cell.

2. Walsura ternata.—A small tree, bark smooth rust coloured, leaves alternate trifoliate, leaflets narrow lanceolate entire, above smooth, beneath whitish, 4-5 inches long by 1 inch broad, petioles 2 inches long rust coloured, stipules 0, panicles axillary bracts single small caducous, flowers very numerous small white, calyx and corol as in W. piscidia, divisions of the stamen tube alternately rounded and bidentate, disk salver-shaped with a large high callous margin, stigma large, apex 2 lobed, berry narrow oblong downy indehiscent 1 seeded. *Roxb. Fl. Ind.* ii. 389.

I have only seen this tree in the Godavery forests and in the hilly districts of the northern division of the Madras Presidency, and my specimens are only in fruit, it is called Chinnà Wallursi in Teligu.

3. Walsura Gardneri, *Thw.*—A small tree about 12 feet high, leaves unifoliate glabrous, leaflet entire ovate obtusely acuminate 3-6 inch long by $1\frac{1}{2}$-$2\frac{1}{2}$ broad, petiolule 1-3 lines long articulated with the much longer petiole, fruit oblong slightly apiculate at the apex 6-8 lines long, flowers the same as in W. piscidia. *Thw. En. Zey. p.* 61.

Ceylon, in the central provinces 2,000 to 4,000 feet elevation (perhaps only a 1-foliate variety of No. 1.)

HEYNEA. Roxb.

For Gen. Char. see letter press to plate of H. affinis, Pl. cxxxiv.

1. Heynea affinis, *WA.*—For description, &c. see Pl. cxxxiv.

BEDDOMEA. Hook. fil.

For Gen. Char. see letter press to Pl. cxxxv.

1. Beddomea simplicifolia, *Bedd.*—For description, &c. see Plate cxxxv.

2. Beddomea Indica, *Hook. fil.*—A large shrub or very small tree, erect or straggling, young parts scaly pubescent, leaves trifoliate or pinnate 5-12 inches long by 6-9 inches broad, leaflets 1-2 pair with an odd one, below slightly lepidote or glabrous, entire sub-coriaceous elliptical obtusely pointed, 4-7 inches long by $2\frac{1}{2}$ broad, petioles of the lateral leaflets $\frac{1}{4}$ to $\frac{1}{2}$ an inch long, of the terminal one, 1 inch long, racemes axillary or a little above the axils simple or paniculate furnished as is the calyx with rust coloured close pressed scales, few or many flowered, 3-6 inches long, flowers about 3 lines in diameter on pedicels 1-3 lines long furnished with a small bract at the base of each pedicel, petals glabrous equal in size or 2 interior smaller, stamen-tube very short slightly crenate at the margin, anthers sessile at the apex of the tube almost wholly exerted very large thick 3-angled with a thickened connective, fruit ovate to oblong, 1-$1\frac{1}{2}$ inches long more or less furrowed, rough with close set rusty scales, dehiscent, seeds several. *Hook. fil, Gen. Pl.* 1. *p.* 336, name only.—*Bedd. in Linn. Trans. Vol.* xxv.

Common throughout the Western ghats of the Madras Presidency from Coorg down to Cape Comorin, up to 3,500-4,000 feet elevation.

CARAPA. Aubl.

For Gen. Char. see letter press to Pl. cxxxvi.

1. Carapa Moluccensis, *Lam.*—For description, &c. see Pl. cxxxvi.

SWIETENIA. Linn.

Gen. Char. : Calyx small 5 cleft imbricate, petals 5 patent contorted, staminal tube urceolate, 10 toothed, anthers 10 fixed in the teeth of the tube apiculate disk annular ovary sessile ovoid 5 celled, stigma discoidal 5 radiate ; ovules many in the cells, pendulous from the axis, capsule 5 celled, septicidally 5 valved from the base, seeds numerous imbricate in 2 series, winged. A tree, leaves abruptly pinnate glabrous, leaflets opposite petiolulate obliquely ovate with a long acumination, panicles axillary and subterminal, flowers small.

1. Swietenia Mahogoni, *Linn.*—This is the true mahogoni tree, a native of central America (the only species of the genus) it is mentioned here as it has been introduced into several places in this Presidency and in Bengal, and grows admirably, and its extended cultivation is receiving attention.

SOYMIDA. A. Juss.

For Gen. Char. see letter press to Pl. viii.

1. Soymida febrifuga, *Juss.*—For description, &c. see Pl. viii.

CHICKRASSIA. A. Juss.

For Gen. Char. see letter press to Pl. ix.

1. Chickrassia tabularis, *Juss.*—For description, &c. see Pl. xi.

CEDRELA. Linn.

For Gen. Char. see letter press to Pl. x.

1. Cedrela Toona, *Roxb.*—For description, &c. see Plate x.

CHLOROXYLON. DC.

For Gen. Char. see letter press to Pl. xi.

1. Chloroxylon Swietenia, *DC.*—For description, &c. see Pl. xi.

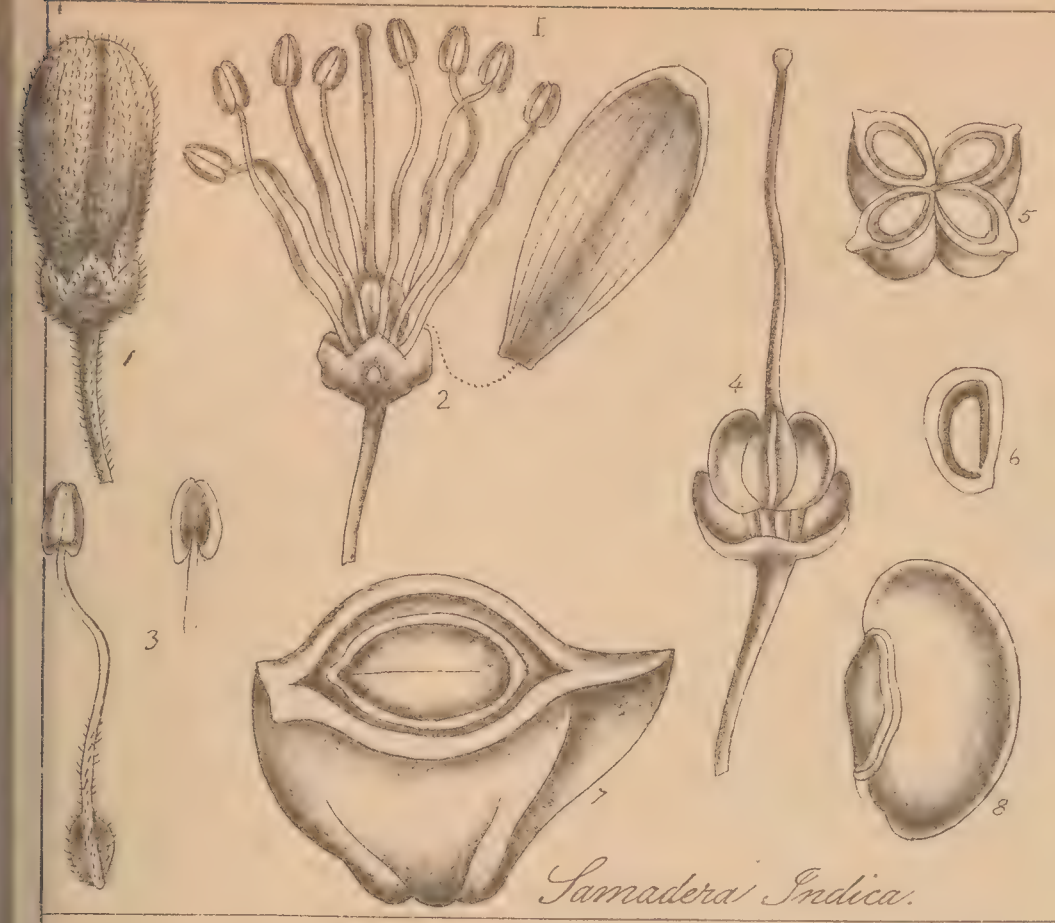
Simarubeæ

Ochnaceæ.

Meliaceæ.

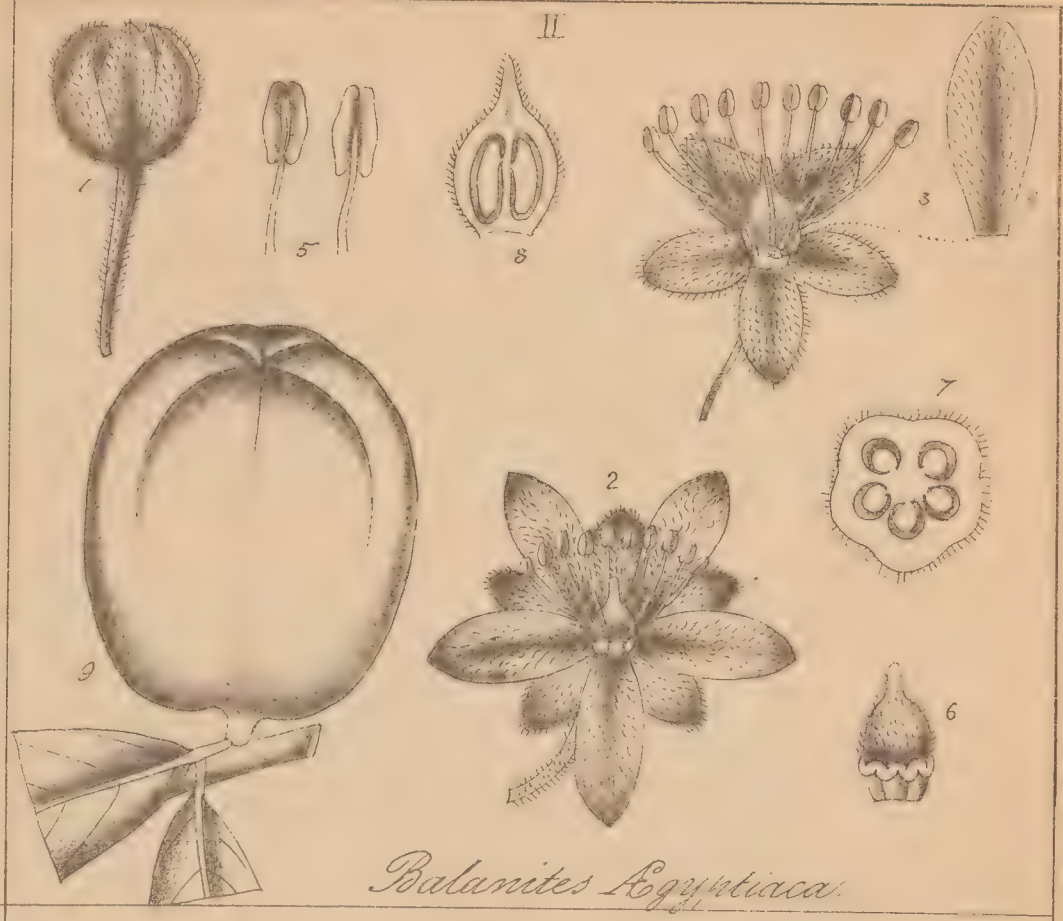
PL. VIII.

I



Samadera Indica.

II

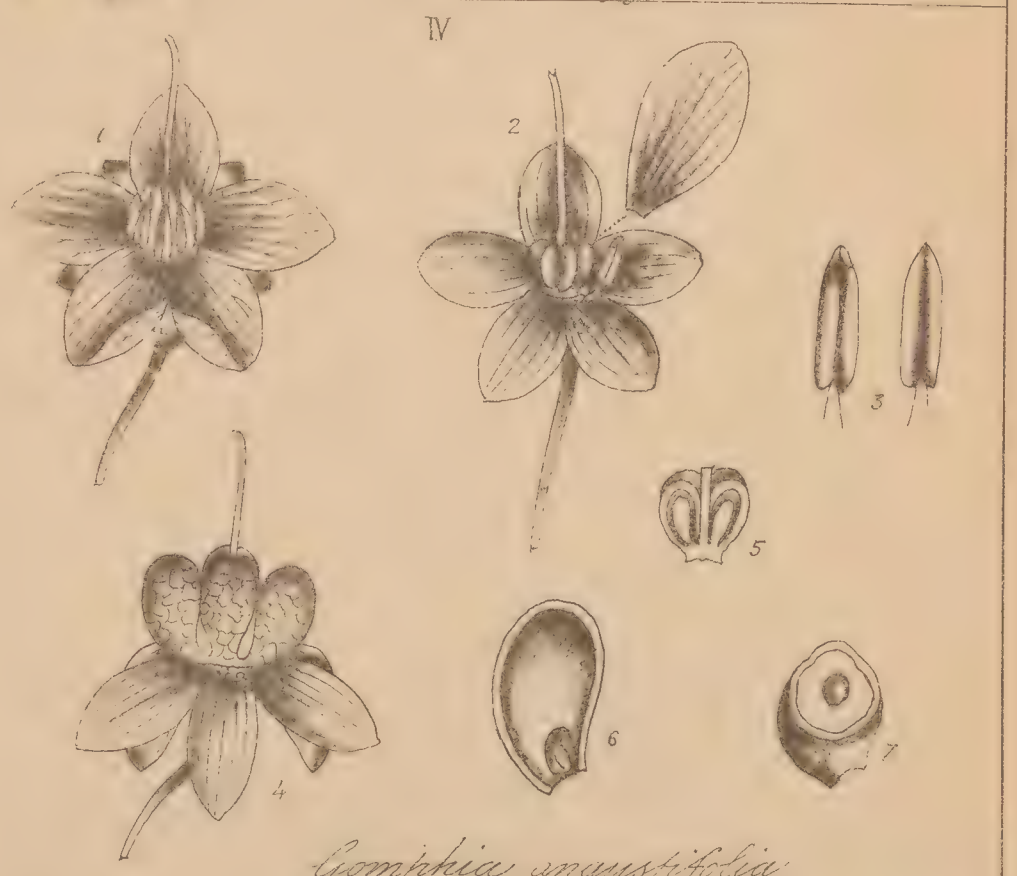


Balanites Egyptiaca.

III

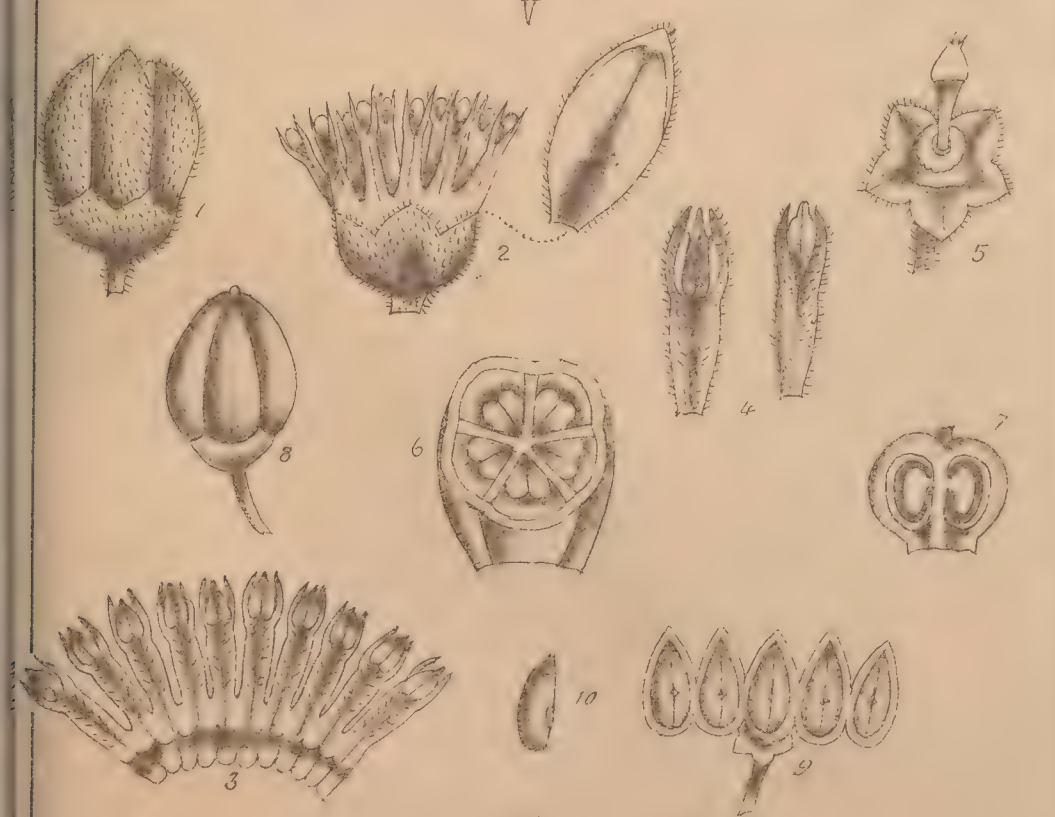
Ochna squarrosa.

IV



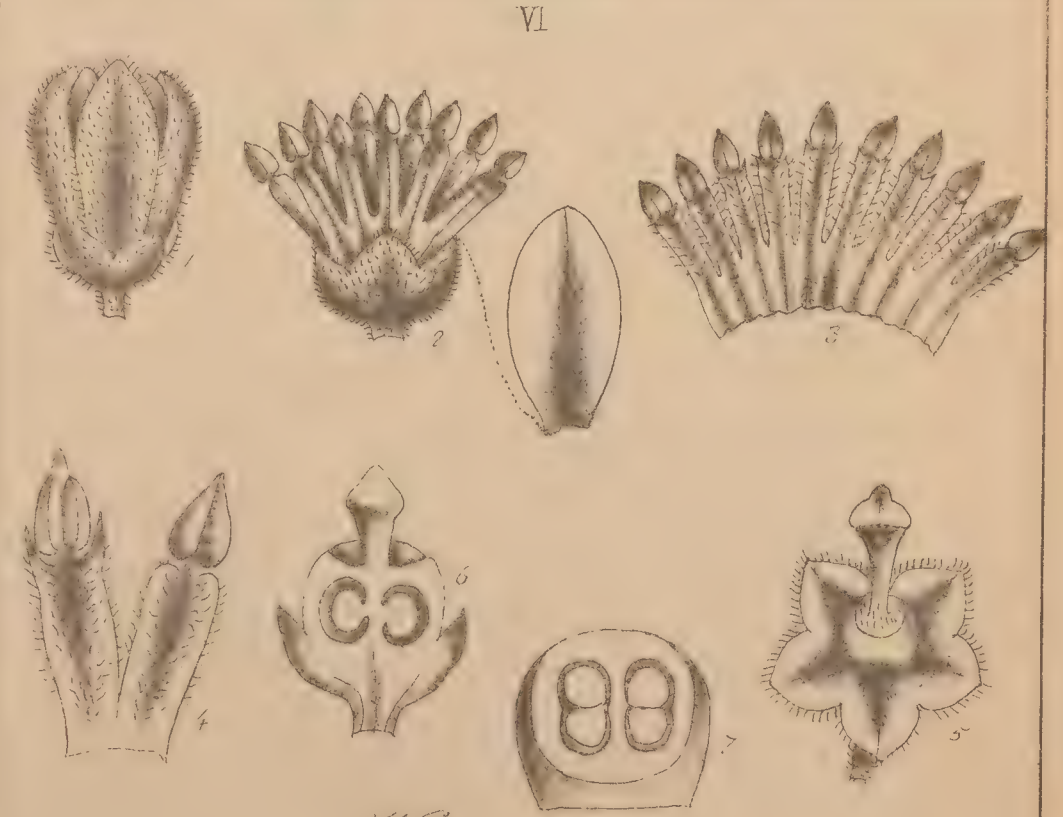
Gomphia angustifolia

V



Aitken Rich.

VI



Walsura piscidia.

ORDER XXV—CHAILLETIACEÆ.

Flowers hermathrodite or unisexual, sepals 5 connate below or free, equal or unequal, imbricate, petals 5 more or less exceeding the calyx free and equal or more rarely more or less connate with the stamens, usually more or less unguiculate 2-fid or 2-partite; stamens 5 alternate with the petals (or rarely united with them), anthers 2 celled elliptical to linear the connective often dorsally thickened; hypogynous glands opposite to the petals free or connate, ovary free (rarely inferior in some extra-Indian examples) 2-3 celled, styles 2-3 (rarely only 1 in species not Indian) free or connate short or elongate, stigmas capitate or simple, ovules geminate, drupe oblong or compressed pubescent dry or fleshy, the epicarp opening and disclosing the putamen or indehiscent putamen 1-2 celled, bony or crustaceous sometimes dividable, cells 1 seeded, seeds pendulous, testa membranaceous, albumen none, embryo large, cotyledons amygdaloid, radicle superior small. A small order only represented by 1 small tree in S. India.

CHAILLETIA. DC.

Gen. Char.: Flowers hermathrodite or unisexual; calyx 5 parted, lobes nearly or quite equal more or less imbricate, petals 5 usually more or less clawed 2 fid or 2 partite, rarely very shortly united with the stamens into a tube at the base; stamens 5, anthers elliptical to linear the connective frequently thickened behind, hypogynous glands 5 distinct or connate opposite to the petals. Ovary free (rarely inferior in species not Indian), styles 2-3 (rarely 1 only) free or connate short or elongate, stigmatose at the apex, drupe coriaceous dry or fleshy, putamen 1-2 (rarely 3) celled crustaceous or bony. Small trees or shrubs, pubescent or glabrous, leaves alternate entire, flowers small usually white in axillary pedunculate or nearly sessile cymes or glomerules. *DC. in Ann. Mus.* 17. 153. Moacurra, *Roxb. Fl. Ind.* ii. 69. Wahlenbergia, *Br.* Symphyllanthus, *Vahl.* Dichapetalum, *Thouars.* Leucosia, *Thouars.* Quilesia, *Blanco.*

1. Chailletia gelonioides, *Roxb.*—A small tree or often only a shrub, bark rough, young shoots villous and yellowish, leaves alternate short petioled broad lanceolate entire taper-pointed membranaceous 3-4 inches long by 1¼ broad, stipules subulate villous, flowers numerous small on axillary solitary short peduncled fascicles, calyx-segments oval hoary, petals free the length of the calyx but narrower and smooth, glands 5 small oval, ovary (in the fertile flowers only) ovate cordate a little compressed downy 2 celled with 2 ovules in each, pendulous from the apex of the cells, styles 2 recurved, stigmas somewhat 2 lobed, capsule transversely oval 2 lobed soft with grey or whitish down, size of a nutmeg, epicarp opening, putamen dividable into 2.—Moacurra gelonioides, *Roxb. Fl. Ind.* ii. p. 69. Chailletia, *Benth. & Hook. Gen. Pl.* 1. *p.* 341.

This small tree or shrub is very common in all the Western ghat forests of the Madras Presidency up to 4000 feet elevation, also in Ceylon, and Bengal (where it is called Moakurra.)

Analysis of Genera, Pl. IX, fig. 1.

Chailletia gelonioides.

1 & 2. Bud and flower, showing the imbricate sepals.
3. A male flower opened.
4. A petal removed.
5. Anthers.
6. Ovary from a fertile flower.
7. The same cut vertically.
8. A fruit.

ORDER XXVI—OLACINEÆ.

Flowers regular, hermaphrodite or unisexual. Calyx small, 4-5 toothed, fid, or partite, occasionally nearly entire or obsolete, unchanged or accrescent in fruit. Petals 4-5, free or connate more or less, usually valvate in æstivation. Stamens 4-10, rarely 12-40 free or united below more or less to the petals, rarely monadelphous; anthers 2-celled. Disk cupuliform entire or lobed, rarely unilateral, or 0. Ovary free or the lower part immersed, 1-celled or 3-5-celled, the dissepiments frequently incomplete above. Style simple. Ovules solitary in each division of the ovary (rarely several in each cell) or geminate in 1 celled ovaries, pendulous. Fruit 1 celled, 1 seeded, dry or drupaceous, indehiscent. Seed usually with a copious fleshy albumen, rarely exalbuminous; embryo minute, apical, or shorter than or nearly equalling the albumen, with foliaceous cotyledons. Trees or shrubs. Leaves alternate, entire or nearly so, usually penniveined; exstipulate. Inflorescence various. Flowers small.

* Stamens mixed with staminodia... ... ...Olax.
** Stamens all fertile as many as the petals and opposite to them.
Calyx accrescent in fruit, ovary 3-5 celled nearly to the apex... ... ...Strombosia.
Calyx unchanged, but disk enlarging with the fruit, ovary 1 or imperfectly 2 celled, ovules 2-3 ... ...Anacolosa.
Calyx unchanged, disk of 4-5 scales surrounding the ovary, ovary 1 celled 1 ovuled ... .Opilia.
*** Stamens all fertile as many as the petals and alternate with them.
† Petals glabrous or subglabrous.
Anthers tufted with soft hairs, flowers capitate in umbellate spikes ... ...Lasianthera.
Anthers glabrous, or very slightly pilose, flowers in axillary or lateral cymes, stigma sessile large discoid...Gomphandra.
Anthers glabrous, style eccentric or oblique, stigma small... ... ...Apodytes.
†† Petals villous. ... ...Mappia.

Not an order of much importance, but little is known of the timber of any of its representatives; the genera Strombosia, Anacolosa, and Lasianthera each furnish a single species, lofty trees, the first found in the Western ghat forests of S. India and in Ceylon, the second only detected as yet in the dense forests of the Anamallays, and the third peculiar to Ceylon. Olax is represented by two small trees, both common to Ceylon, and one found all over the Madras Presidency. Opilia has a single species, a straggling weak

tree or shrub common throughout this Presidency and in Ceylon. Gomphandra two small trees or large shrubs common throughout the western forests of this Presidency and in Ceylon. Apodytes and Mappia each give a middling sized tree common to Ceylon and the western forests of Southern India, the latter is very fetid when in blossom ; the only other plant belonging to this order (in S. India) and not coming within the scope of this Flora is a climbing species of Olax, Wight's genus. Bursinopetalum is Mastixia of Blume and belongs to Cornaceæ.

OLAX. Linn.

Gen. Char. : Calyx cupuliform entire or nearly so, small whilst flowering, at length often accrescent and enclosing the fruit, petals 5-6 valvate free or slightly coherent or connected by alternating filaments, stamens generally 3 antheriferous alternate with the petals, and 5 anantherous and opposite to them, or occasionally 5 antheriferous and opposite the petals, and 3 anantherous and alternate, anthers ovate versatile, filaments more or less adnate to the petals, ovary 1-celled above and more or less 3 celled at the base narrowed into a style, ovaries 3 pendulous from the apex of the central placenta, stigma obtuse or 3 lobed, drupe oblong or globose enclosed within the accrescent calyx or naked, nut crustaceous 1 seeded, seed spuriously erect, embryo minute oblong in the apex of copious albumen. Glabrous trees or shrubs, leaves alternate entire or nearly so, flowers small in short racemes or the common peduncle nearly obsolete, rarely solitary.—Spermaxyrum, *Labill.* Fissilia, *Comm.* Lopadocalyx, *Kl.* Pseudaleia and Pseudaleioides, *Thouars.*

1. Olax Zeylanica, *L.*—A small tree, erect, young branches acutely angled glabrous transversely rugulose, leaves glabrous shining ovate acuminate about 2 inches long by $\frac{3}{4}$ of an inch broad, racemes axillary very short few flowered, pedicels short and each covered with a bract as long as itself, sterile filaments with their apices bifid. *DC. Prod.* 1. 532 ;—*WA. Prod. p.* 88 ;—*Thw. Pl. Zey. p.* 42. Ceylon, abundant at the south of the island, called Malla, the leaves are eaten in curries.

2. Olax Wightiana, *Wall.*—A shrub or small tree, branches terete glabrous, leaves ovate or oblong quite glabrous upper side shining under pale, $3\frac{1}{2}$-4 inches long, by $1\frac{1}{2}$ broad, petioles about 3 lines long, racemes axillary about 1 inch long often several together lax usually compound, pedicels about 4 lines long many times longer than the subtending bractes, petals usually 5, sterile anthers bifid. *Wall. L. n.* 6779 ;—*WA. Prod. p.* 89.

Easily distinguished from Zeylanica (and from O. scandens, a climbing plant) by its lax racemes and flowers double the size. Common throughout the Madras Presidency and in Ceylon.

Analysis of Genera, Pl. IX, fig. 2.

Olax Wightiana.

1. A bud showing the obsoletely lobed calyx, the bract much smaller than the pedicel and the valvate petals.
2. Corol opened showing the 5 petals, the 3 fertile stamens, 2 of which are alternate with the petals and the 3rd placed on one of the petals a little to its side, and the 5 sterile bifid stamens each opposite to a petal, all 8 being adnate to the petals.
3. A flower, the corol removed, showing the young ovary, the style 3 ribbed towards the apex and the 3 stigmas.
4. The ovary in a more advanced stage showing the accrescent calyx
5. Fertile anthers, front and back view.
6. Ovary cut vertically, showing that it is 1 celled at the apex with the placentas rising from the base, bearing 3 pendulous ovules at their apex.
7. The base of the ovary cut horizontally, showing the 3 cells and 3 ovules.

STROMBOSIA. Bl.

For Gen. Char. see letter press to Pl. cxxxvii.

1. Strombosia Ceylanica, *Gardn.*—For description, &c. see Pl. cxxxvii.

ANACOLOSA. Bl.

For Gen. Char. see letter press to Pl. cxxxviii.

1. Anacolosa densiflora, *Bedd.*—For description, &c. see Pl. cxxxviii.

OPILIA. Roxb.

Gen. Char. : Calyx minute, 5 or rarely 4 toothed. Petals 5, rarely 4 hypogynous, valvate in the bud. Stamens as many opposite to the petals, free, filaments filiform ; anthers ovate. Disk of 5, rarely 4 scales, alternating with the stamens. Ovary 1 celled, tapering into a short thick truncate style ; ovule solitary, erect. Drupe with a thin sarcocarp and crustaceous endocarp. Seed erect ; embryo linear, short, or nearly as long as the albumen. Shrubs or small trees, sometimes climbing. Leaves alternate, entire. Flowers in axillary racemes ; pedicels 3 together in the axils of peltate bracts, which are imbricate at an early stage, but fall off before the flowers expand.

1. Opilia amentacea, *Roxb.*—A scrambling half climbing shrub or small weak tree, glabrous, or the young leaves and shoots minutely tomentose pubescent. Leaves petiolate, ovate lanceolate, or almost oblong, acute or acuminate, 2 to 3 or even 4 inches long, or rarely shorter and very obtuse, entire, thinly coriaceous, the veins usually prominent though fine. Racemes before flowering resembling little cylindrical cones of $\frac{1}{2}$ inch, the peltate imbricate but almost squarrose bracts alone visible, when in flower slender, about 1 inch long without bracts. Flowers very small, on filiform pedicels of about 1 line. Petals about $\frac{1}{2}$ line long, very deciduous. Drupe ovoid or globular, $\frac{1}{3}$ to $\frac{3}{4}$ inch long. Embryo linear, nearly as long as the albumen. *Wight Illust. t.* 40. O. Javanica, *Miq. Fl. Ind. Bat.* i. *part* i. 784 ;—*Roxb. Pl. Corom.* ii. 31. *t.* 158 ;—*Benth. Fl. Aust. vol.* i. 394.

Not uncommon in jungles throughout the plains of the Madras Presidency and in Ceylon.

Analysis of Genera, Pl. IX, fig. 3.

OPILIA AMENTACEA.

1. A bud, showing the obsoletely toothed calyx and the valvate petals.
2. A flower, showing the 5 large glands alternate with the stamens the latter being opposite the petals.
3. The same, petals removed.
4. Anthers, front and back view.
5. The ovary.
6. The same cut vertically, showing the erect ovule (not pendulous as figured by Wight and as generally described).
7. The ripe fruit.
8. The same cut horizontally, showing the seed with the central cylindric embryo.
9. Seed cut vertically, showing the embryo nearly as long as the seeds.

All drawn from fresh specimens collected at the foot of the Nilgiris.

LASIANTHERA. P. DEBEAUV.

For Gen. Char. see letter press to Pl. cxxxix.

1. LASIANTHERA APICAULIS, *Thw.*—For description, &c. see Pl. cxxxix.

GOMPHANDRA WALL.

Gen. Char.: Flowers polygamous subdiœcious, calyx cupulate minute 4-6 toothed, petals 4-6 inserted on a very small hypogynous disk valvate with incurved tips more or less cohering in a tube free at the apex, filaments as many hypogynous alternate with the petals and slightly coherent with them at the base or free distinct or more or less connate into a tube, anthers adnate to the inside of the apex of the filaments sessile or nearly so or attached by their back to a longish thread, ovary 1 celled, stigma sessile broadly discoid, ovules 2 pendulous, drupe oblong, putamen crustaceous, seed pendulous, albumen fleshy 2 dividable somewhat resembling the fleshy cotyledons, embryo small apical. Small glabrous or pubescent trees or large shrubs, leaves entire, flowers small cymose.—Stemonurus, *Bl. Bijdr.* 648, ex part. Platea, *Thw.* (not *Blume.)*

1. GOMPHANDRA AXILLARIS, *Wall.*—A small tree or large shrub glabrous or the branches minutely puberulous, leaves submembranaceous conspicuously veined and veinlets very finely reticulated, very variable in shape from narrow lanceolate to almost orbicular terminating in a rather long acumination from $2\frac{1}{2}$ to $5\frac{1}{2}$ inches long, $\frac{1}{2}$-$2\frac{1}{2}$ broad, glabrous on both sides or slightly puberulous when young, petioles $\frac{1}{4}$-$\frac{1}{2}$ inch long, cymes pubescent short axillary many flowered in the male, few flowered in the female, calyx very small, petals 4-5 glabrous about 3 lines long, much united, filaments 4-5 hairy at the apex, anthers sessile or subsessile within the apex of the filament just appearing above the petals, ovary small oblong smooth, stigma large fleshy, drupe oblong smooth. *Wall. in Roxb. Fl. Ind.* ii. 328 *under* Lasianthera tetrandra. Gomphandra polymorpha, *Wight Ill.* 1. *p.* 103, *& Icones t.* 954. Stemonurus axillaris, polymorphus, Ceylanicus and Heyneanus, *Miers. in Ann. of Nat. Hist. Ser.* 2. *vol* x. *p.* 37-42.

Very common in all the western forests of the Madras Presidency and in Ceylon, from the plains up to 4,000 feet elevation.

2. GOMPHANDRA CORIACEA, *Wight.*—A small tree or large shrub glabrous or the young parts, leaves, &c. minutely puberulous; leaves coriaceous opaque and inconspicuously veined, generally shining above, as variable and similar in shape and size as the last species, and from scarcely acute to a long narrow acumination, cymes pubescent longer than in the last species, flowers 4-6 merous, anthers attached by a thread to the inside of the filament, the rest as in axillaris, but the filaments are less hairy. *Wight Ill.* 1. p. 103. G. polymorpha, *Icones Pl.* 953. Stemonurus Gardneri & Walkeri, *Miers. l. c.* Platea Wightiana, *Miers. l. c.*

Very common on the Nilgiris, Pulneys and Anamallays at the higher elevations, and throughout the western forests of the Madras Presidency and in Ceylon from an elevation of about 3000 feet to 7000.

Analysis of Genera, Pl. IX. fig. 4.

GOMPHANDRA CORIACEA.

1. A bud, showing the slightly toothed calyx and valvate sepals.
2. A flower open.
3. A flower, corol removed, shewing six filaments inserted into the bottom of the calyx round the disk.
4. The same open, showing the ovary and disk.
5. A corol removed, showing the six coherent but easily separable valvate petals and the inflexed tips.
6. Filament, back view, shewing the weak white hairs at its apex.
7. The same inside view, showing the anther as it naturally appears.
8. The same, showing that the anther is really attached by its back to a minute filiform true filament, which latter is attached to the apparent filament (in reality a staminal tube) below the apex on the inside.
9. Ovary cut vertically, showing its single cell and 2 pendulous ovules.
10. A fruit.

All drawn from fresh specimens collected on the Nilgiris. As far as I can make out from my dried specimens of G. axillaris, the anther is always sessile or subsessile within the apex of the filament; it certainly never has such a long thread as in this species; both are probably 4-6 merous, and the filaments are sometimes quite free and at other times quite consolidated into a tube. I almost doubt their being distinct species, and think that coriacea may be a higher level coriaceous variety of Wallich's axillaris. I have a great variety of forms in my Herbarium.

APODYTES. E. MEYER.

For Gen. Char. see letter press to Pl. cxl.

1. APODYTES BENTHAMIANA, *Wight.*—For description, &c. see Pl. cxl.

MAPPIA. JACQ.

For Gen. Char. see letter press to Pl. cxli.

1. MAPPIA FŒTIDA, *Miers.*—For description, &c. see Pl. cxli.

ORDER XXVII—ILICINEÆ.

Flowers regular, hermaphrodite or unisexual, calyx of 4-6 (rarely 3) sepals, imbricate, usually persistent, petals 4-6 (rarely 3) hypogynous imbricate in the bud, sometimes united in a lobed corolla. Stamens of the same number as petals and alternate with them hypogynous, free or adhering to the corolla at the base, anthers 2-celled opening inwards. Disk none except the thickened base of the ovary. Ovary free 3 to 5 celled, rarely many celled ; stigma broad or capitate, sessile or supported on a distinct style. Ovules 1 or 2 in each cell, pendulous, with a superior micropyle. Fruit a drupe, with as many one-seeded pyrenes as cells. Seeds pendulous, testa membranous, embryo very small in the apex of a fleshy albumen. Trees or shrubs. Leaves alternate, simple, without stipules. Flowers small, in axillary umbels or cymes, rarely solitary or terminal. Fruit small.

A small order only represented in India by the genus Ilex, which has 5 species in South India and Ceylon. Ilex Wightiana, denticulata and Malabarica, large timber trees, and I. Gardneriana and Walkeri small trees ; the first and second are common to the western forests of Madras and to Ceylon ; the third and fourth are only found in our western forests ; and the fifth only in Ceylon. The common English holly, *Ilex aquifolium*, has been introduced on the Nilgiris, but will not make any growth.

ILEX. LINN.

For Gen. Char. see letter press to plate of I. denticulata, Pl. cxlii.

1. ILEX DENTICULATA, *Wall.*—For description, &c. see Pl. cxlii.

2. ILEX MALABARICA, *Bedd.*—For description, &c. see Pl. cxliii.

3. ILEX WIGHTIANA, *Wall.*—A very large umbrageous tree, glabrous or the young parts very minutely puberulous, leaves alternate from ovate to ovate elliptic acute, acuminate or mucronate, coriaceous quite entire, dark green and shining above a little paler beneath, $1\frac{1}{2}$-$2\frac{1}{2}$ inches long by 1-$1\frac{1}{2}$ broad, petioles about $\frac{1}{2}$ an inch long channelled along the upper side and inconspicuously puberulous, peduncles $\frac{1}{4}$ inch long axillary or from the scars of fallen leaves, generally bearing 2 branched, 3-5 flowered pedicels at the apex and a solitary longish pedicelled flower in the fork, branched pedicels about the length of the peduncles, all minutely pubescent, flowers polygamous pentamerous 3 lines in expansion, petals combined into a rotate corol to fully $\frac{1}{2}$ their length, stamens erect slightly incurved inserted on to the centre of the corol just within the lobes, drupe size of a pea quite red when ripe. *Wight Icones tab.* 1216.

This is a very large tree, often attaining an immense girth, it is very common on the Nilgiris at 6-8000 feet elevation, and in other localities on our western mountains, but generally at considerable elevation, and it is also found in Ceylon ; the timber is a pale yellow and very useful for building purposes and plank, bowls, platters, &c., and is much in use on the Nilgiris, where it is called Horralu by the Burghers.

A small fragment of a flowering branch (male) and dissections of a male flower of this tree are figured in Plate cxlii. (with Ilex denticulata.)

4. ILEX GARDNERIANA, *Wight.*—A small tree or large shrub, glabrous, leaves subcoriaceous or membranaceous ovate lanceolate or sub-cordate quite entire ending in a long acumination, about 4-6 inches long by 1-$1\frac{1}{2}$ inches broad, petioles 1 inch long, peduncles axillary or aggregated in the axils of fallen leaves slightly pubescent and together with the 5 merous flowers very similar to those of I. Wightiana, only rather more crowded and the flowers slightly larger ; fruit, &c. as in Wightiana. *Wight Icones tab.* 1217.

This small tree I have only seen on the Nilgiris (western side), it is closely allied to Wightiana, but is seldom much more than a shrub.

5. ILEX WALKERI, *Wight and Gard. MSS.*—A small tree, leaves coriaceous glabrous shining entire or rarely sparingly denticulate, oblong or rotundate acute or retuse and mucronate, more or less attenuated at the base, 4-12 lines long by 2-7 lines broad, petioles $1\frac{1}{2}$-2 lines long slightly winged, umbels sessile or shortly pedunculate, pedicels about $1\frac{1}{2}$ lines long, flowers pentamerous. *Thw En. Pl. Zeyl. p.* 184.

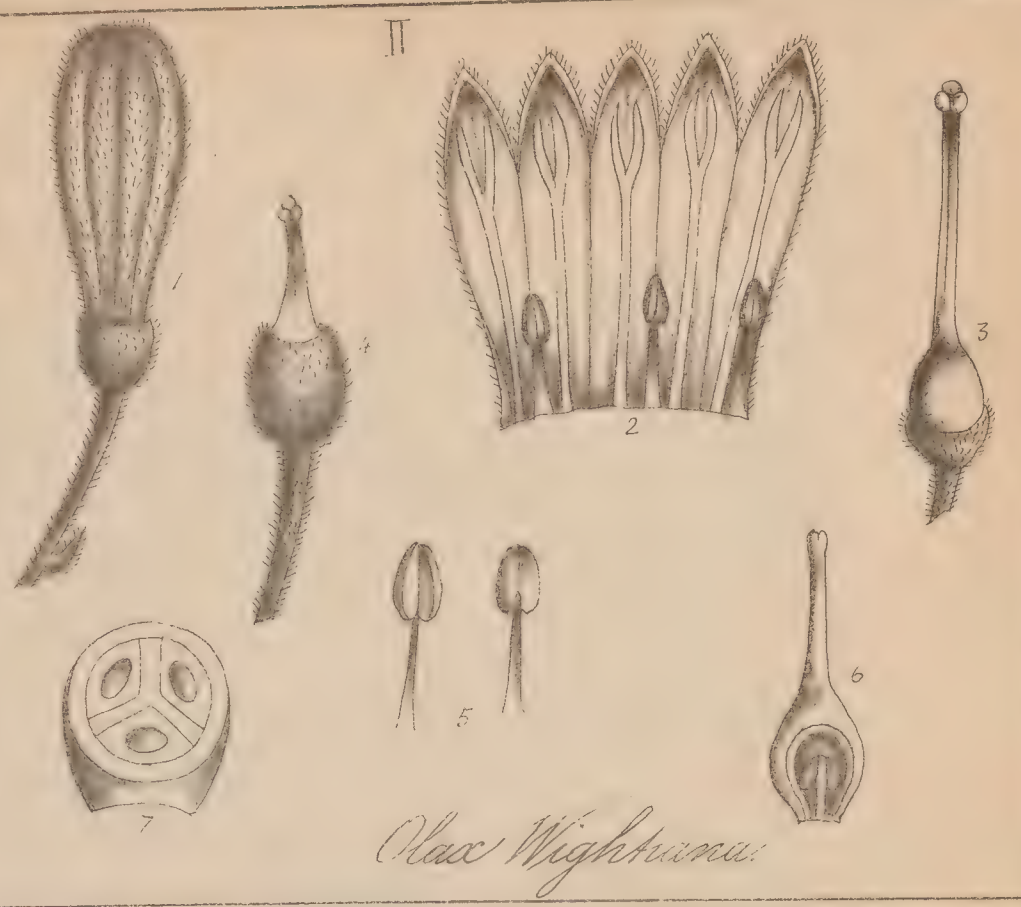
Ceylon, in the central provinces, 5000-8000 feet elevation.

Chailletiaceæ. Olacineæ Celastrineæ.

I

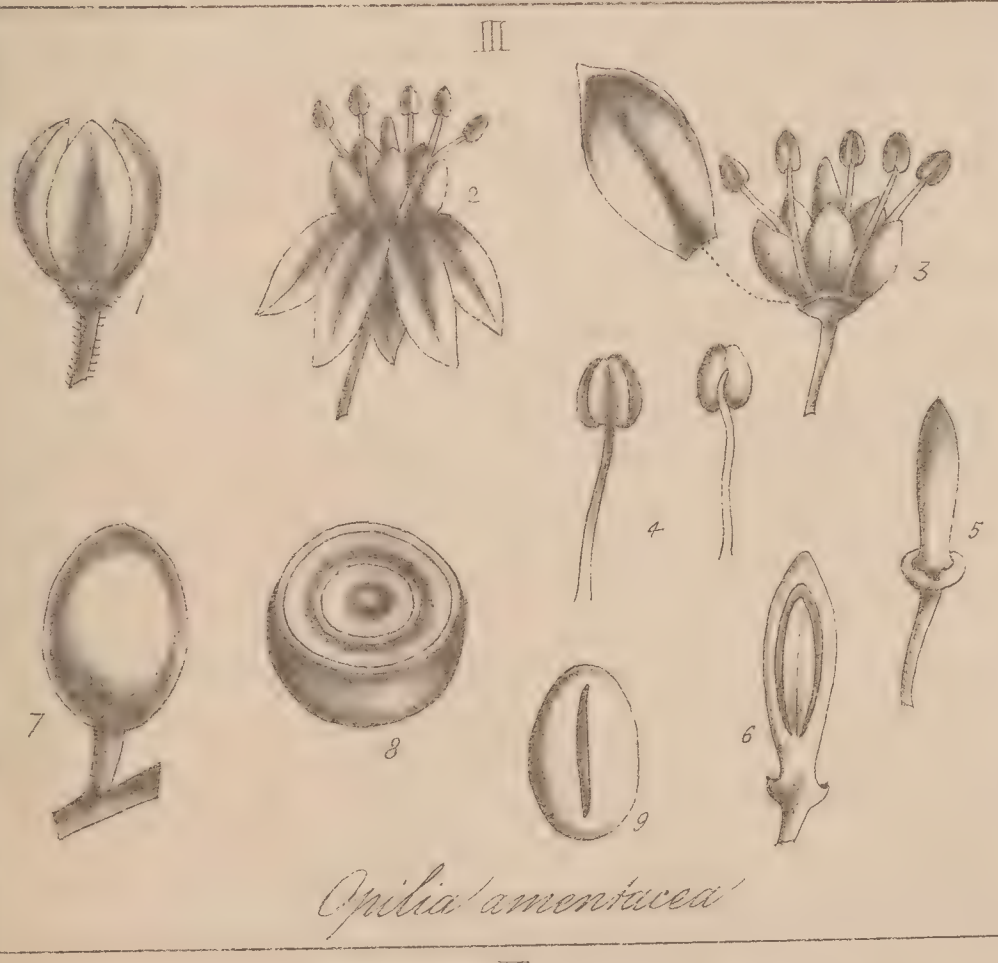
Chailletia gelonioides

II



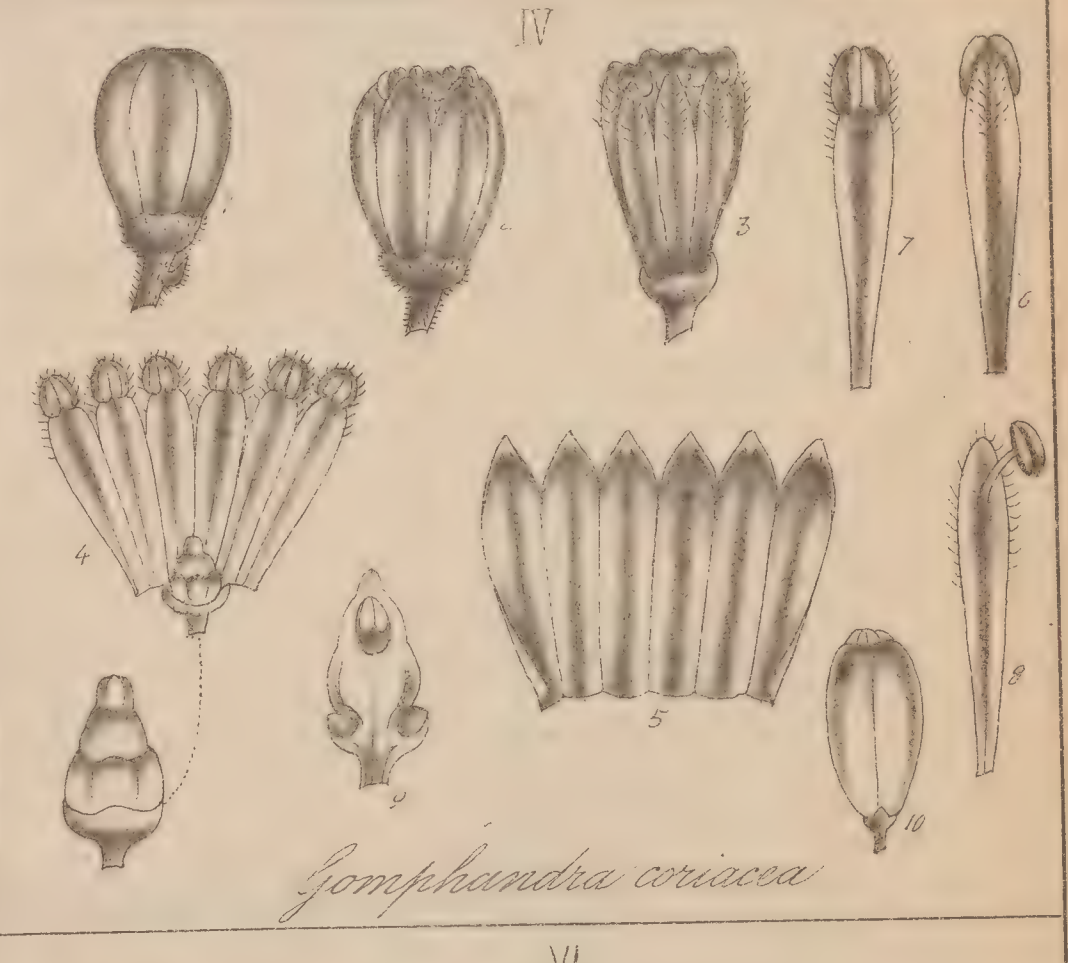
Olax Wightiana.

III



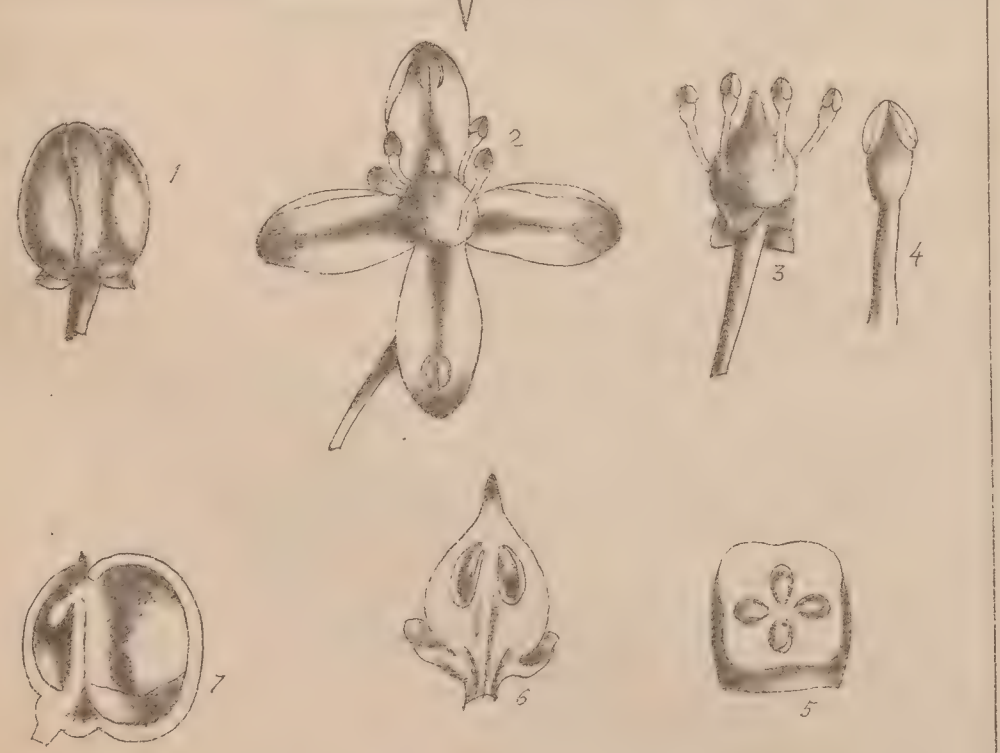
Opilia amentacea

IV



Gomphandra coriacea

V



Glyphopetalum Zeylanicum.

VI

Microtropis ramiflora.

Govindoo, del:

Dicenphy Lith·

ORDER XXVIII.—CELASTRINEÆ.

Gen. Char.: Flowers regular, hermathrodite or polygamous. Calyx small, persistent, 4 or 5 cleft, rarely 3 or 6 cleft. Petals as many as calyx segments, spreading, imbricate or rarely valvate in the bud. Stamens as many as petals and alternate with them, inserted round the base or on the margin of the disk, or upon the disk itself; filaments usually short incurved; anthers short, 2 celled, the cells in a few genera confluent into one. Disk usually conspicuous, more or less fleshy, flat or broadly cup-shaped, or thick and conical, nearly free, or adnate to the base of the calyx or confluent with the ovary. Ovary sessile on the disk, 2 to 5 celled, tapering to a short style with an entire or lobed stigma, ovules usually 2 in each cell, ascending with a ventral raphe, occasionally several, rarely 1 only or pendulous with a dorsal raphe. Fruit a capsule, berry, drupe, or samara, rarely divided into distinct carpels. Seeds usually enveloped in an arillus, sometimes winged; albumen fleshy or almost horny or none; embryo usually rather large, with flat cotyledons and a short radicle next to the hilum. Trees or shrubs, occasionally thorny; or woody climbers. Leaves opposite or alternate, entire or toothed. Stipules minute and very deciduous or none, rarely large and encircling the young leaf bud, deciduous. Flowers small, white or greenish, in axillary cymes or small racemes or in terminal panicles.

A considerable S. Indian Order, the peculiar disk readily characterizes the greater number of the genera; where that is wanting (as in some species of Microtropis) the insertion of the ovules and inferior radicle are the chief points separating this order from Ilicinæ; from Rhamneæ, with which the real affinity is much closer, the stamens alternating with the petals is a constant distinctive mark.

The genus Euonymus which is abundant in the moist western forests of this Presidency and in Ceylon, yields 6 small trees and 1 shrub, all of which have a very hard close grained wood which might be used as a substitute for box, and which is well worth attention. Microtropis grows in the same localities and is represented by 4 small trees or shrubs with wood very similar to that of Euonymus. Glyptopetalum yields 2 large shrubs both common to our moist western forests, one of them also being found in Ceylon. Lophopetalum is only represented by one species, a lofty tree peculiar to our western forests, most abundant in S. Canara, where the timber is much in use for building purposes (under the name of Balpale). Kokoona also has only one representative, a lofty tree peculiar to Ceylon. Pleurostylia yields one small tree not uncommon in our dry subalpine forests on both sides of the Presidency and in Ceylon. Celastrus represented in all our dry forests by small rigid often thorny shrubs and by 1 small tree. Kurrimea and Trochisandra, closely allied genera, are each represented by only 1 species (lofty trees), the former peculiar to Ceylon and the latter to our western forests (Anamallays 3-6000 feet.) Elæodendron has two species both trees, one common in Ceylon, and the other common throughout this Presidency. Hippocratea and Salacia are abundantly represented by climbing shrubs.

Tribe I, CELASTREÆ.—Stamens the same number as the petals inserted round the disk or on its margins, seeds albuminous.

Sub-tribe, EUONYMEÆ.—Leaves opposite.

* Fruit capsular dehiscent.
α. Ovules 1-2 in the cells (rarely many in Euonymus.)
Petals free, ovules 2 (rarely more) fixed to the axis.. ... ...EUONYMUS.
Petals free, ovules solitary pendulous... ... ...GLYPTOPETALUM.
Petals combined... ... ...MICROTROPIS.
β. Ovules 4 or more in the cells.
Seed albuminous with an aril, not winged.. ... ...LOPHOPETALUM.
Seed exalbuminous exarillate winged... .. ..KOKOONA.
* * Fruit indehiscent .. ..PLEUROSTYLIA.

Sub-tribe, CELASTREÆ—Leaves alternate (except in Elæodendron.)

* Fruit dehiscent.
Style 1, stigma 3-4 lobed .. ..CELASTRUS.
Styles 2, fruit entire .. ..KURRIMIA.
Styles 2, stamens on a ring-like stamen tube, fruit 2 lobed ... ...TROCHISANDRA.
* * Fruit indehiscent.
Leaves opposite and alternate, fruit an olive-like drupe ... .ELÆODENDRON.

Tribe II, HIPPOCRATEÆ.—Stamens usually 3, with a 5 merous calyx and corol inserted on the disk, albumen none.

Fruit of distinct usually dehiscent carpels, seeds winged ... ...HIPPOCRATEA.
Fruit baccate indehiscent, seeds not winged... ... ...SALACIA.

EUONYMUS.

For Gen. Char. see letter press to Pl. cxliv.

1. EUONYMUS CRENULATUS, *Wall.*—For description, &c., see Pl. cxliv.

2. EUONYMUS DICHOTOMUS, *Heyne.*—A small tree, leaves coriaceous from narrow oblong-lanceolate to ovate-lanceolate tapering at both ends blunt at the point quite entire, about 3 inches long by $\frac{1}{2}$-$1\frac{3}{4}$ inches broad, petioles 3 lines long, peduncles solitary or 2-3 together from simple to twice or thrice dichotomous, few flowered, one-third to half the length of the leaves, petals 5 orbicular, style scarcely any, stigma blunt, capsule turbinate tapering downwards 5 winged towards the apex. *Heyne in Roxb. Fl. Ind. (ed. Wall.)* 2, *p.* 410;—*WA. Prod. p.* 160.

A small tree common in various parts of the western forests of the Madras Presidency up to 4000-4500 feet, it is very common in the moist forests above Ponachy on the Anamallays; the wood is very hard, close grained, and answers as a substitute for box in wood engraving.

3. EUONYMUS GOUGHII, *Wight.*—A small tree glabrous, leaves entire ovate oblong acute at both ends acuminate about 3 inches long by $1\frac{1}{4}$ broad, petioles 3-4 lines long, peduncles axillary generally only 1-2 lines long sometimes elongate about 1 inch long,

1-3 flowered, pedicels $\frac{1}{4}$ inch long, flowers pentamerous, petals orbicular fimbriated on the margin, ovary immersed in the disk 5 celled with 2 ovules in each cell, fruit about 1 inch long turbinate very broad at the apex rather acutely 5 winged. *Wight Ill. p.* 178 ;—*Icones tab.* 215.

A small or middling sized tree not very uncommon throughout the western ghat forests of the Madras and Bombay Presidencies. It is at once known from the other S. Indian species by its fimbriated petals. My Tinnevelly specimens (1,500 feet elevation) have the peduncle only about 1 line long and the pedicels the length of the petiole. My Coorg and S. Canara specimens (3-4000 feet) have the peduncle 1 inch long, they both agree in foliage, in the fimbriate petals and sharply angled fruit. It is an exceedingly elegant tree and is common about Mercara ; it is probably the E. Indicus of Heyne.

4. Euonymus angulatus, *Wight.*—A small tree, branches acutely angled and furrowed between, leaves quite entire very coriaceous glabrous, deep shining green above paler beneath, and the veins very indistinct, ovate with a very cordate base and subsessile, to ovate-lanceolate shortly petioled, $2\frac{1}{2}$-$4\frac{1}{2}$ inches long by $1\frac{1}{2}$-2 broad, flowers in lax axillary or supra-axillary cymes which are from $\frac{1}{2}$ as long to much longer than the leaves and several times dichotomous, flowers large dull red, 5-6 merous, calyx entire or fimbriate on the margin, petals orbicular, capsule turbinate much attenuated downwards obtusely winged at the apex. *Wight Icones tab.* 1,053. Euonymus acutangulus, *Wight Ill. p.* 178. Euonymus pterocladus, *Hohenacker in Herb. Kew.*

A very elegant small tree only observed on the Nilgiris and in Coorg, it is common on the Sisparah ghat, it is easily distinguished from the others by its very opaque almost veinless leaves and large lax cymes.

5. Euonymus serratifolius, *Bedd.*—A glabrous shrub, branches terete, leaves glabrous scarcely coriaceous more or less sharply and prominently serrated from narrow-lanceolate to broad-lanceolate tapering at the apex into a small blunt point $3\frac{1}{2}$-4 inches long by $\frac{3}{4}$-$1\frac{1}{2}$ broad, petioles $\frac{1}{4}$ inch long, cymes axillary generally several together filiform from $\frac{1}{3}$ as long to nearly as long as the leaves, flowers 5-merous, petals orbicular, capsule nearly globose with 5 rounded lobes.

I have only observed this elegant species on the slopes of the Nilgiris (Ouchterlony valley 3000 feet) and on the Carcoor ghat, Wynad, it does not grow to more than a shrub, whereas all the other species become small trees, it is known by its prominently serrated leaves and very filiform cymes.

6. Euonymus revolutus, *Wight.*—A middling sized or small tree, young shoots obtusely 4 angled at length terete, leaves sometimes tern coriace ous, revolute on the margin quite entire or slightly crenated towards the apex, oval roundish to rather obovate obtuse at the apex, 2 inches long by $1\frac{1}{4}$ broad, petioles 1-2 lines long, peduncles axillary generally in pairs from $\frac{1}{4}$ to $\frac{1}{2}$ as long as the leaves 1-3 flowered, when 1 flowered furnished with 2 bracteoles at the insertion of the pedicel, flowers 5 merous, petals orbicular. *Wight Ill. p.* 178. Nearly allied to E. crenulatus.

Ceylon, at high elevations in the Central provinces.

7. Euonymus Walkeri, *Wight.*—A small tree, branches terete slender, young shoots obscurely 4 sided, leaves glabrous slightly coriaceous subsessile, lanceolate to ovato-lanceolate with a long tapering apex, rather prominently serrated above the middle, 3-4 inches long by 1-$1\frac{1}{4}$ broad, inflorescence on very short axillary, dichotomous peduncles, only 2-3 lines long, flowers 5 merous petals orbicular undulate on the margin, capsule turbinate 5 angled. *Wight Ill.* i. *p.* 178.

Ceylon, abundant up to 3000 feet, distinguished from the other species by its very short inflorescence.

There is an undescribed downy-leaved species of this genus on the Anamallays (Anagoondy Shola), a large shrub, but I have only seen it in fruit.

GLYPTOPETALUM. Thw.

Gen. Char. : Calyx small 4 lobed, lobes imbricate, petals 4 patent or reflexed sometimes furnished with 2 hollow pits on the upper side near the apex, disk large 4 lobed, stamens 4 inserted on to the disk, filaments subulate or very minute, anther cells divaricate at the apex of a thick connective. Ovary immersed in the disk and confluent with it, 4 lobed 4 celled, style short or wanting, ovules solitary in the cells pendulous from the apex of the axis, capsule subglobose coriaceous, tardily dehiscent 1-4 celled, 1-4 seeded, seed as in Euonymus. Glabrous shrubs with 4 angled branches, leaves opposite serrate or subentire, cymes axillary or supra-axillary, flowers yellow.

1. Glyptopetalum Zeylanicum, *Thw.*—A large shrub, leaves glabrous opposite lanceolate very sharply serrate except at the base, acute at the apex, 4-6 inches long by $1\frac{1}{2}$-$2\frac{1}{2}$ broad, petioles $\frac{1}{4}$ inch long, cymes axillary or supra axillary, dichotomous at the apex with a single flower in the fork, secondary peduncles at right angles with the peduncles and 3 flowered at the apex, peduncles 1-$1\frac{1}{2}$ inches long with small bracteoles at the apex, secondary peduncles $\frac{1}{2}$ inch long bracteoled at their apex, pedicels $\frac{1}{2}$ inch long, the 2 lateral ones bracteoled below the middle, flowers yellow 4-5 lines in expansion, petals patent or reflexed each with 2 pits on the inside near the apex, ovary slightly 4 lobed tapering upwards into a short conical style, capsule round 1-4 seeded, seed $\frac{1}{2}$ an inch long half hid in the red aril. *Thw. En. Pl. Zey. p.* 73.

Anamallays (Anagoondy sholas) 2000 feet. Tinnevelly and Travancore ghats, 2-3000 feet. Ceylon. The dissections and analysis are taken from Tinnevelly specimens. I have not seen the Ceylon plant, but there can be no doubt that they are identical.

Analysis of Genera. Pl. IX, fig. 5.

Glyptopetalum Zeylanicum.

1. A bud showing the imbricate sepals and petals.
2. A flower open.
3. The same, petals removed.

4. An anther.
5. Ovary cut horizontally.
6. Ovary cut vertically.
7. Fruit cut vertically.

2. Glyptopetalum grandiflorum, *Bedd.*—A large glabrous shrub, leaves glabrous opposite oval to ovate lanceolate acute at the apex, entire or obscurely serrated towards the apex, 4-7 inches long and up to 3 inches broad, petioles about 3 lines long, peduncles supra-axillary filiform slender 4-6 inches long, dichotomously 3 flowered at the apex and furnished with minute scale-like bractes at the insertion of the pedicel, pedicels about 1 inch long recurved ebracteolate, flowers tetramerous $\frac{3}{4}$-1 inch in expansion bright yellow, petals patent or reflexed without pits, anthers subsessile, connective very large. *Bedd. Icones. Pl. Indiæ Orientalis tab.* cii.

This very beautiful shrub I have only met with in the Wynad 2500-3000 feet, it is not uncommon about Devala.

MICROTROPIS. Wall.

Gen. Char.: Flowers sometimes unisexual, sepals 5 imbricate, persistent, petals 5 (rarely 0) imbricate, rounded, connate at the base into a short ring; disk none, or ring like and connate with the petals, or free; stamens 5 inserted on the apex of the disk or in its absence on the ring at the base of the corol, each stamen being alternate with a petal, ovary free ovoid, 2-3 celled generally imperfectly, style thick, stigma 2-4 lobed, ovules 2 in each cell fixed by pairs collaterally at or a little above the centre of the axis, capsule oblong coriaceous 1 celled 2 valved 1 seeded, tardily dehiscing, seed erect oblong, albumen fleshy, cotyledons foliaceous. Trees or shrubs glabrous, leaves opposite entire coriaceous, flower small white in peduncled axillary cymes or in sessile fascicles, seed with a red succulent testa resembling an arillus.—Paracelastrus, *Miq. Fl. Ind. Bat.*

A genus allied to Ilex by its monopetalous corol and defective disk.

1. Microtropis ramiflora, *Wight.*—A middling sized tree, leaves very coriaceous oblongo-lanceolate to oval or obovate obtuse or slightly emarginate, 1-3 inches long by $\frac{1}{2}$-2 inches broad, petiole 1-2 lines long, flowers aggregated in dense clusters along the naked branches, peduncle from $\frac{1}{2}$ to 2 lines long, calyx scariose at the margin, petals somewhat obovate slightly jagged at the margins, fruit oblong obtuse, testa succulent reddish orange. *Wight Icones tab.* 976.

This tree is common at Ootacamund and on the higher ranges of the Anamallays, Pulneys, &c., and in Ceylon; the timber is worthy of attention.

Analysis of Genera, Pl. IX, fig. 6.

1. A flower bud.
2. A flower.
3. The same open, showing the disk or stamen tube adnate to the base of the corol, the 5 petals of which are combined into a ring at the base.
4. Anthers, front and back view, showing the filament apiculate at the apex and attached to the back of the anther nearly at the top.
5. Ovary cut transversely, showing it imperfectly divided into cells.
6. The same cut vertically.
7. A fruit.
8. The same cut vertically, showing the embryo and inferior radicle.
9. The same cut transversely.

2. Microtropis densiflora, *Wight.*—A small tree or large shrub, leaves coriaceous glabrous broad oval obtuse, about 3 inches long by $1\frac{3}{4}$ broad, cymes axillary erect compact many flowered 12-18 lines long, bracts apiculate, capsule slender cylindric pointed, testa crimson. *Wight. Ic. tab.* 1052.
Nilgiris, western slopes.

3. Microtropis ovalifolia, *Wight.*—A large shrub or small tree, leaves coriaceous oval or ovate, shining above paler beneath 2-$2\frac{3}{4}$ inches long by $\frac{3}{4}$ to $1\frac{1}{2}$ inch broad, petiole 2-3 lines long, cymes axillary once or twice dichotomous 1 to nearly 2 inches long, petals orbicular, fruit oblong attenuated at the base, apiculate at the apex. *Wight Icones tab.* 976, *et* M. microcarpa, *l. c. tab.* 975.

Common on the higher ranges of the Nilgiris and Pulney mountains.

4. Microtropis Wallichiana, *Wight MS.*—A large shrub or small tree, leaves very variable in texture and size, from subcoriaceous to very coriaceous, bright shining green above, pale or almost white beneath, oblong to almost obovate acute or with a longish sudden point up to 8 inches long and to $3\frac{1}{4}$ broad, petioles 2-4 lines long, flowers sessile or subsessile in axillary generally very dense sometimes few flowered clusters, fruit oblong $\frac{1}{2}$ an inch long with a whitish rind, testa scarlet. *Wight MS;—Thw. En. Pl. Zey. p.* 71.

A very variable species, common throughout the western forests of this Presidency and in Ceylon, up to 5000 feet elevation. My Ceylon specimens quite correspond with some of the less coriaceous forms of S. India.

LOPHOPETALUM. Wight.

For Gen. Char. see letter press to Pl. cxlv.

1. Lophopetalum Wightianum, *Arnt.*—For description, &c. see Pl. cxlv.

KOKOONA. Thw.

For Gen. Char. see letter press to Pl. cxlvi.

1. Kokoona Zeylanica, *Thw.*—For description, &c. see Pl. cxlvi.

PLEUROSTYLIA. WA.

Gen. Char. : Calyx small 4 lobed, petals 5 much larger than the calyx, stamens as many inserted below the disk, filaments short flat, anthers with a broad connective at the back, opening longitudinally; disk thick fleshy crenulate, ovary half immersed in the disk and confluent with it, 1 celled, style short thick, stigma broadly peltate, ovules two in each cell erect, fruit indehiscent 1 celled, sarcocarp thin and fleshy marked on one side about the middle with the remains of the style, endocarp a crustaceous membrane separable from the sarcocarp and having several clefts at the base, seed erect solitary (rarely 2,) covered with the aril-like endocarp, testa coriaceous, albumen copious fleshy, cotyledons large orbicular flat. A small tree with angled branches, leaves opposite entire, cymes axillary short few flowered. *WA. Prod. p.* 157.

1. Pleurostylia Wightii, *WA.*—A small tree or large shrub, glabrous, leaves from narrow lanceolate to broad-lanceolate or oval, occasionally obovate, 1½-2 inches long, petioles about 3 lines long, cymes about the length of the petioles, flowers about 1½ lines in diameter, fruit oblong rather attenuated at the base 2½-3 lines long, 1½ lines in diameter. *WA. Prod. p.* 157. Celastrus ? Wightiana, *Wall.* Celastrus opposita, *Wall. in Roxb. Fl. Ind.* (*ed Wall.*) ii. 398. Pleurostylia Heynei, *WA. Prod. p.* 157.

A small tree common in the subalpine forests of the Madras Presidency.

Analysis of Genera, Pl. X, fig. 1.

1. A bud magnified.
2. A flowering branch magnified, showing the ovary semi-immersed in the disk and the stamens attached below the margin of the torus.
3. Anther, front view.
4. Anther, back view, showing the large connective.
5. Ovary cut vertically, showing the single cell and 2 erect ovules.
6. Fruit branch, natural size.
7. A seed, the aril-like endocarp separated so as to bring the globose seed in full view.
8. A seed cut vertically.

CELASTRUS. Linn.

Gen. Char. : Flowers frequently polygamous. Calyx 5 partite or 5 fid. Petals 5, sessile usually spreading. Stamens 5 inserted upon or under the margin of the disk; anthers dehiscing longitudinally. Ovary 2-3 (rarely 4) celled, free or more or less confluent with the disk; style short; stigma with as many lobes as cells in the ovary or subcapitate. Ovules 2 in each cell. Capsule globose or obovoid, often trigonous, 3-2-1 celled, with 1 or 2 seeds to each cell, dehiscing loculicidally. Seeds with a fleshy albumen, frequently more or less invested by a fleshy arillus. Shrubs or trees, frequently armed with axillary spines. Leaves alternate, usually more or less coriaceous and serrulate or toothed. Flowers small in cymes or racemes.—Gymnosporia, *WA.* Orixa, *Thunb.*

1. Celastrus Senegalensis, *Lam.*—A small tree, glabrous, usually glaucous or pale green, unarmed or young shoots often spinescent at their extremities (purplish) and bearing leaves and flowers, leaves very variable in size and form, coriaceous elliptic to obovate usually very obtuse or retuse occasionally subacute, tapering at the base into the petiole, serrulate or sometimes nearly entire, ¾ to 4 inches long by ⅓rd to 2 inches broad, petiole from 1 to 6 lines usually dilating into the lamina, cymes axillary solitary or fascicled, usually considerably shorter than the leaves, forking from or below the middle, from loose to rather compact, ovary broad based surrounded by a fleshy disk 2-3 celled, in the fertile flower with a deeply 2-3 cleft style, capsule globose or obovoid 3 angled, about the size of a pea and blackish when dry, 2-3 valved with 1-2 seeds in each cell. *Lam.*;—*DC. Prod.* ii. 8. Celastrus montana, *Roxb. Fl. Ind.* i. 620.

A small tree, sometimes only a shrub, common throughout the Presidency in dry jungles both in the plains and subalpine forests; in Teligu it is called Pedda chintu (the smaller species, C. emarginata, being called Chintu); its wood is very hard and durable, and much in use for ploughs and various purposes with the natives; it is also found in Africa and Australia.

Analysis of Genera, Pl. X., fig. 2.

1. A leaf and cyme of flowers, natural size.
2. A bud.
3. A full flower.
4. The same, petals removed.
5. Anthers, front and back view.
6. Ovary cut vertically, showing the erect ovules.
7. Ovary cut transversely, showing its 3 cells, each 2 ovuled.

2. Celastrus emarginata, *Willd.*; 3. C. ovata, *Wall.*; 4. C. Wallichiana, *Spr.*; 5. C. Rothiana, *WA.*; and 6. C. Heyneana, *Roth.*; are only shrubs of small size, generally thorny; they are all closely allied, at least in their flowers. C. paniculatus, *Willd*, is a climber common in all our jungles.

All the above are described in Wight and Arnott's Prodromus. C. fruticosa, a Ceylon shrub described by Thwaites in his *En. Pl. Zey.*, is scarcely distinct from some of the small leaved forms of C. montana.

KURRIMIA. Wall.

For Gen. Char. see letter press to Pl. cxlvii.

1. Kurrimia Ceylanica, *Arnt.*—For description, &c. see Pl. cxlvii.

TROCHISANDRA. Bedd.

For Gen. Char. see letter press to Pl. cxx.

1. Trochisandra Indica, *Bedd.*—For description, &c. see Pl. cxx.

ELÆODENDRON. Jacq.

For Gen. Char. see letter press to Pl. cxlviii.

1. Elæodendron Roxburghii, *WA.*—For description, &c. see Pl. cxlviii.

2. Elæodendron glaucum, *Pers.*—A middling sized or small tree, trunk straight, bark smooth olive colored, branches numerous, leaves opposite short petioled oblong and cuneate oblong, acutely or obtusely serrate, coriaceous hard and polished, the upper side shining, rather obtuse at the apex, 3-4 inches long by about 2 broad, panicles axillary shorter than the leaves dichotomous, flowers pedicelled small greenish yellow, bractes small oblong 1-3 at the base of each pedicel and at the divisions of the panicle, flowers 5-merous, calyx caducous, ovary immersed on the very large 5-gonal green fleshy disk 2 celled with 2 ascending ovules in each, style short conical, stigma simple obtuse, drupe nearly round, size of a cherry, smooth pulpy olive colored 1 celled, nut oval a little rugose 2 grooved, very thick and hard, 1-2 celled. *Roxb. Fl. Ind. (ed Wall.) vol.* ii. *p.* 432.

A common tree in Ceylon from the sea level up to 4500 feet. Roxburgh mentions that it is a native of various parts of India, but I have not observed it in this Presidency.

HIPPOCRATEA. Linn.

Gen. Char. : Flowers hermaphrodite. Sepals 5. Petals 5, exceeding the sepals, erect or spreading, imbricate or valvate. Stamens 3, filaments recurved or reflexed at the tip, usually dilated around the ovary below or concealed in lateral notches of the ovary. Anthers various, from quadrate to transversely elongate-oblong, extrorse, rarely subsessile, ovary surrounded by or raised upon a disk, 3 celled ; style very short or subulate or 0 ; stigma terminal, 3 lobulate or subentire, or stigmatic, lobes 3, under the margin of the ovary ; ovules 2-10 in each cell 2 seriate. Fruit carpels 3, distinct flat, rarely nearly cylindrical, coriaceous, usually dehiscing along the median line. Seed compressed, usually dilated into a broad wing below, exalbuminous ; cotyledons flat, connate ; radicle very short, inferior. Climbing shrubs, leaves opposite, entire or serrate. Flowers in axillary cymes or more rarely terminal cymose panicles, usually small.

A genus of climbing shrubs. The following species inhabit Southern India :—1. H. Indica, *Willd.* 2. H. obtusifolia, *Roxb.* 3. H. Arnottiana, *Wight.* and 4. H. Grahami, *Wight.* The two first are also found in Ceylon and are described in Wight and Arnott's Prodromus ; the last two are described by Dr. Wight in his *Illustrations.*

Analysis of Genera, Pl. X, fig. 3.

Hippocratea Arnottiana.

1. A flower.
2. Anther, showing its 1 cell.
3. Ovary cut transversely, 3 celled with 2 ovules in each cell.
4. Ripe fruit burst.
5. A seed removed.
6. A seed cut transversely.
7. The same cut longitudinally to show the inferior radicle.

All magnified from Dr. Wight's Ill.

SALACIA. Linn.

Gen. Char. : Flowers hermaphrodite. Sepals 5. Petals 5. Stamens 3. Anthers variously 2 celled or lobed ; cells distinct or confluent, or 1-celled (4-locellate). Filaments usually inserted within or upon a disk. Ovary 3-celled ; style very short, or subulate ; stigma terminal ; ovules 2 or more in each cell. Fruit baccate, undivided, 1-3 celled, 1 or several seeded. Climbing or straggling shrubs. Leaves opposite or subopposite, coriaceous, subentire or serrulate. Flowers small, usually in axillary sessile or very shortly pedunculate fascicles.—Johnia, *Roxb. Fl. Ind.* i. *p.* 168. Anthodon et Raddisia, *DC. Prod.* 1. Tontelea, *Walp. Rep.* 1. Diplesthes, *Harv. in. Hook. Lond. Journ.* 1. 19.

A genus of climbing or straggling shrubs, scarcely ever deserving the name of trees. The following species inhabit S. India and Ceylon :—1. S. oblonga, *Wall.* 2. S. reticulata, *Wight.* 3. S. prionoides, *DC.* 4. S. Brunoniana, *WA.* 5. S. pomifera, *Wall.* 6. S. macrosperma, *Wight.* 7. S. diandra, *Thw.* The first three are common both to S. India and Ceylon, and 4, 5, and 6 are only found in S. India, and 7. peculiar to Ceylon ; they are all described in Dr. Wight's works, except S. diandra, which is described in Dr. Thwaites' *Enumeration.*

Analysis, Pl. X, fig. 4.

Salacia oblonga.

1. A flower.
2. The same, sepals forced open and petals removed.
3. Stamens showing the 2 celled anther.
4. Ovary cut transversely
5. A ripe fruit.
6. The same cut transversely.
7. A seed, the adhering pulp removed.
8. The same cut transversely.

All magnified, except the fruit and seed, from Wight's Illus.

ORDER XXIX.—RHAMNEÆ.

Gen. Char.: Flowers regular, hermaphrodite, or rarely polygamous. Calyx campanulate, urceolate, or cylindrical, the tube persistent and often adnate to the ovary or disk; lobes 4 or 5, valvate, usually with a raised longitudinal line inside and deciduous. Petals 4 or 5, concave or hood-shaped, inserted at the base of the calyx-lobes, alternating with and rarely exceeding them, or none. Stamens 4 or 5, alternating with the calyx-lobes, inserted with the petals and opposite to them when present; filaments short, filiform; anthers small, often enclosed in the petals, rarely oblong or exserted. Disk rarely wanting, usually filling the calyx-tube or lining it, or annular round the ovary when inferior, rarely cup-shaped and free. Ovary sessile on the disk or immersed in it, or more or less inferior, 3 celled, or rarely 2 or 4 celled; style short, entire, or with as many lobes or branches as ovary cells; stigmas terminal, capitate or club shaped. Ovules solitary in each cell, erect, anatropous, with a dorsal or rarely lateral raphe. Fruit a drupe or capsule, the border of the adnate base of the calyx forming a ring at the base or round the fruit or at the summit; epicarp thin and dry or fleshy; endocarp separating into as many membranous coriaceous or hard cocci as cells, or woody or bony divided into cells. Seed solitary, erect, usually ovate and somewhat compressed, often arillate; testa coriaceous or crustaceous and shining or rarely membranous; albumen fleshy, or almost horny, often scanty, rarely wanting; embryo usually straight with flat rather thick cotyledons and a short inferior radicle. Shrubs, trees, or climbers. Leaves alternate or rarely opposite, undivided, entire or toothed. Stipules usually present but very deciduous, rarely spinous and persistent. Flowers small, usually green or yellowish, in cymes or umbel-like clusters, either solitary or forming axillary or terminal compound cymes, racemes or panicles.

Leaves 3-5 nerved at the base, drupe succulent, the putamen woody or bony 1-4 celled	...Zizyphus.
Leaves 3-nerved a little above the base, penninerved upwards, drupe with a thin epicarp, covering membranous or crustaceous cocci	...Colubrina.
Leaves penninerved, ovary sessile on the disk	..Rhamnus.
Leaves penniveined, ovary immersed in the disk	...Scutia.

Of little importance as a forest order. Zizyphus jujuba is the well known Ber tree and yields a timber of some value, but there is nothing else of importance to the forester. Z. xylopyra, rugosa, and glabrata, are small trees, and nummularia, Œnoplia, and napeca are shrubs all (except the last, which is peculiar to Ceylon) common throughout S. India; colubrina yields a small tree, Rhamnus two shrubs and a small tree, and Scutia one thorny shrub. Noltia Africana, Harv. et Sond. (Vitmannia, WA. Prod. 166*) is a common hedge shrub or small tree on the Nilgiris, but has been introduced from the Cape of Good Hope. Ventilago is a climbing genus represented by two S. Indian plants. V. Madrasapatana, Gœrtn., and V. calyculata, Tul., and a third doubtful species, V. Bombaiensis, Dalz., which has a strong resemblance to my Zizyphus Wynadensis (Icones Pl.* cxiv*) but with larger leaves, also differing in being distantly crenated instead of sharply serrated. When the fruit of these two species is discovered, they will I think be found to be congeneric if not identical, and will perhaps form a new genus; my plant is a lofty tree which I myself saw felled at Devala in the Wynad. Gouania, also a climbing genus, has two S. Indian species, G. leptostachya, DC., and G. microcarpa, DC.—Sageretia affinis, Bl. (= Berchemia parviflora, Wall. in WA. Prod.) is a common climbing plant, and Helinus, also a climbing genus, is represented by one species (undescribed) lately detected by me in the Nagpur country. Cordage is made from bark of V. Madrasapatana; and the plant yields a valuable dye known as pupli in the Salem district.*

ZIZYPHUS. Juss.

For Gen. Char. see letter press to Pl. cxlix.

The species may be distinguished as follows:—1. Z. jujuba, an edible 2 celled fruit, leaves tawny brown beneath. 2. Z. xylopyra, leaves whitish beneath, fruit 3 celled not edible. 3. Z. rugosa, flowers in a panicle, nut thin. 4. Z. glabrata, unarmed, leaves glabrous except when very young. 5. Z. napeca, *Lam.*, armed leaves, glabrous except on the veins. 6. Z. nummularia, *WA.*, thorns long and slender, leaves small. 7. Z. Œnoplia, leaves very oblique.—Zizyphus Wynadensis, *Bedd.* (*Icones tab.* cxiv.) with penninerved leaves can scarcely be a Zizyphus, and has the appearance of a Ventilago, but it is a lofty tree. I shall defer future notice of it in this work until its fruit has been found.

1. Zizyphus jujuba, *Lam.*—For description, &c. see Pl. cxlix.

2. Zizyphus xylopyra, *Willd.*—A tolerably large tree, or sometimes in poor soil only a straggling shrub, bark light ash-colored much cracked and corky; thorns, the under one recurved, the upper erect or rather incurved always present in a poor soil, but often absent in good soil; leaves broadly oval to orbicular obtuse, 3 sub 5 nerved slightly cordate and often unequal sided at the base, serrulate, under side softly pubescent and whitish finely reticulated, upper sub pubescent when young at length glabrous from 1 to 2 inches long by nearly as broad, petioles 3-4 lines long, cymes axillary generally shorter than the petioles, ovary 3 celled, styles 3 united below, drupe the size of a cherry oval greenish and downy, nut hard and thick nearly globose slightly rugose, 3 celled. *Willd. Sp.* 1. *p.* 1104;—*Roxb. Fl. Ind.* 1. *p.* 611, also Z. elliptica, *Roxb. l. c. p.* 610, and Z. caracutta, *Roxb. l. c. p.* 612. Z. orbicularis, *DC. Prod.* ii. *p.* 21.

Common in almost every forest in the Presidency and in Ceylon, it is called Ghont in Hindoostanee and Gote in Teligu; the wood of the larger trees is much esteemed, it is yellowish or orange colored, not heavy but hard and durable, it is used for building purposes and for ploughs and various other uses, and makes excellent torches; the fruit is used to make blacking, the leaves are good as fodder.

3. Zizyphus rugosa, *Lam.*—A small tree or more often only a straggling shrub, prickles stipulary short and recurved with a broad densely pubescent base, usually solitary, leaves broadly oval 3-nerved serrate, young ones downy beneath, at length nearly glabrous except on the nerves, 4-6 inches long, cymes long peduncled forming on the leafless branches a large terminal panicle, ovary 3-celled, styles 2 united at the base, drupe obovate, size of a cherry, with a very thin 1-celled 1 seeded putamen. *Lam. Encycl. Meth.* 3. *p.* 319. Z. latifolia, *Roxb. Fl. Ind.* 1. 607.

Very common in dry subalpine jungles on the western side of the Presidency, rarer on the eastern side, common in Ceylon, where it is called Maha-erraminya; it is only used as fuel as far as I have observed; the fruit is eaten.

4. Zizyphus glabrata, *Heyne.*—A small tree unarmed, young branches pubescent, leaves 3 nerved and beautifully reticulated ovate oblong obtuse crenate-serrate glabrous except on the nerves beneath, retuse or often slightly cordate and unequal sided at

the base, glossy and coriaceous, 1-5 inches long by 1-2½ broad, petioles 3-4 lines long, stipules filiform pubescent caducous, cymes scarcely longer than the petioles, flowers green or greenish yellow, stamens longer than the petals, ovary 2 celled, styles 2 nearly distinct, drupe spherical or turbinate the size of a cherry with soft gelatinous sweet pulp, nut obovate rugose flattened, hard and thick, 1-2 celled. *Heyne in Roth. Nov. Sp. p.* 159. Z. trinervia, *Roxb. Fl. Ind.* i. *p.* 606.

A very pretty small tree with dark green glossy foliage not uncommon in the western forests of the Madras Presidency and in Mysore.

5. Zizyphus Napeca, *L.*—A shrub, branches terete, the young ones tomentose, thorns solitary or twin, leaves ovate-lanceolate crenate-serrate obtusely acuminate minutely apiculate oblique at the base, 3-5 nerved, glabrous except on the veins, 2-3 inches long by ¾-1¼ broad, petioles 3 lines long pubescent, cymes about ⅓rd the length of the leaves tomentose, styles 3-4 joined to about the middle, ovary 3-4 celled, fruit globose about 8 lines in diameter fleshy, greenish-purple, 2-4 seeded, putamen bony rugulose.—Rhamnus napeca, *Linn. Fl. Zeyl.* 87. Z. lucida, *Moon. Cat. p.* 17, *and Thw. En. Pl. Zeyl. p.* 74.

A thorny shrub common in Ceylon.

6. Zizyphus nummularia, *Burm.*—A shrub, branches from near the root slender flexuose whitish; thorns stipulary in pairs, the upper one straight slender very sharp and about as long as the leaves, the under one much shorter and recurved; leaves 3-nerved ovate oval or orbicular serrulate, above pretty smooth, beneath with a short dense greyish tomentum, about ½ an inch long, cymes sessile very short, ovary 2-celled, styles 2 united to above the middle.—Rhamnus nummularia, *Burm. Ind. p.* 61. Z. microphylla, *Roxb. Fl. Ind.* i. *p.* 613. Z. rotundifolia, *DC. Prod.* ii. 21.

A very common thorny bush throughout the Presidency.

7. Zizyphus Œnoplia, *Mill.*—A large straggling often climbing shrub, young shoots pubescent, thorns stipulary large and sharp, the lower one recurved, the upper straight; leaves 3 nerved very obliquely ovate acuminate, acute or obtuse or retuse at the base, slightly serrulate or almost entire, under side shortly tomentose, cymes short, ovary 2-celled, styles 2 combined to above the middle, drupe globose shining black size of a pea, nut rugose 1 rarely 2-celled. *DC. Prod.* ii. *p.* 21. Z. Œnoplia and napeca, *Roxb. Fl. Ind.* i. *p.* 611 *&* 613.

A most common hedge plant throughout the Madras Presidency, and in Ceylon, where it is called Erraminya-wel; its fruit is eaten and is a pleasant acid, the bark and root are used medicinally.

COLUBRINA. Linn.

Gen. Char.: Calyx-tube hemispherical; limb 5 cleft; lobes spreading, triangular. Petals 5, clawed, inserted below the disk, hood-shaped. Stamens 5, included in the petals; filaments filiform; anthers ovate, 2-celled. Disk fleshy, filling the calyx-tube. Ovary immersed in the disk and adhering to it, 3 celled, tapering into a 3-lobed style with obtuse stigmas. Capsule nearly globular, slightly 3-lobed, dehiscing septicidally into 3 membranous or crustaceous cocci. Epicarp dry and thin or succulent, the persistent calyx-tube covering about one-third of its length. Seeds obovoid, compressed, 3-gonous; testa smooth, shining, coriaceous; albumen fleshy, thin. Cotyledons flat or incurved. Trees or shrubs. Leaves alternate, 3-nerved at the base or penninerved. Stipules small deciduous. Flowers small, in axillary clusters.

1. Colubrina Asiatica, *Brong.*—A small tree unarmed, branches slender, leaves ovate or broadly cordate gradually narrowed into an obtuse or acute point at the apex or abruptly acuminate, rotundate or sub-cordate at the base, crenate-serrate, 3 sub 5 nerved a little above the base, penninerved upwards, glabrous and shining, but the costa above and the costa and veins beneath are sometimes furnished with a few hairs, 2-3 inches long by 1½-1¾ broad, petioles 3-12 lines long; flowers small green in short pedunculate axillary cymes about the length of the leaves, fruit 3-4 lines in diameter, slightly depressed at the top, furrowed opposite the dissepiments, dehiscing into 3 rarely 4 cocci. *Brong in Ann. Sc. Nat.* x. *p.* 369. Ceanotus Asiaticus, *L. Roxb. Fl. Ind. vol.* i. *p.* 615. C. capsularis, *DC. Prod.* ii. 32.

A small tree not uncommon on the western side of the Madras and Bombay Presidencies, and in Ceylon (north of the island.)

Analysis, Pl. X, fig. 5.

1. An axillary cyme, natural size.
2. A branch in fruit, natural size.
3. A flower magnified, front view.
4. The same, back view.
5. A petal and stamen detached.
6 & 7. Anther, front and back view.

RHAMNUS. Linn.

Gen. Char.: Flowers hermaphrodite or polygamously diœcious. Calyx-tube urceolate; limb 4-5 lobed; lobes triangular-ovate, erect or spreading, keeled inside. Petals 4, 5 or none, inserted on the margin of the calyx-tube considerably above the ovary, hood-shaped or flat. Stamens 4 or 5, with very short filaments. Disk clothing the calyx-tube, margin thin. Ovary free, ovoid, 3 or 4-celled. Styles 3 or 4; stigmas obtuse papillose. Drupe baccate, globose or oblong, encircled at the base by the calyx-tube, with 2-4 pyrenes; pyrenes horny or cartilaginous, dehiscing inwardly or indehiscent. Seeds obovate; testa membranous or crustaceous, smooth or furrowed at the back; raphe dorsal, ventral or lateral; albumen fleshy. Cotyledons flat or with recurved margins, thin; radicle short. Shrubs or trees, leaves alternate or sub-opposite, petiolate, deciduous or evergreen, penninerved, entire or dentate. Stipules small, deciduous. Flowers axillary, racemose or cymose.

1. Rhamnus Wightii, *WA.*—A large shrub unarmed, nearly quite glabrous, young parts turning black in drying, leaves alternate or occasionally subopposite, elliptic-lanceolate with a short sudden mucronated-acumination, rather coriaceous, glabrous and shining, but (under the lens) slightly puberulous on the veins beneath and occasionally a few minute hairs on the lamina above, furnished beneath with inconspicuous hairy-glands in the axils of the veins, sharply and closely serrated, the serratures tipped with an incurved black point, 2½-3½ inches long by 1-1½ broad, petioles about ½ an inch long, pedicels axillary fascicled very short (the axils of the leaves are generally furnished with small leaf and flower bearing ramuli which are often so reduced as to appear like peduncles), inflorescence minutely puberulous (under the lens), flowers greenish yellow 3 lines in expansion ; calyx 5-cleft ; petals very small spathulately-obovate apiculate, cucullate ; ovary red 3-4 lobed 3-4 celled, styles as many as the lobes joined to the middle and then diverging, fruit roundish, red, 3 lines in diameter, seed with a deep furrow at the base on the outer side. *WA. Prod. p.* 164. Ceanothus Wightiana, *Wall. L. N.* 4,264.

A common shrub in the more elevated parts of the western forests of Madras and Bombay, and on the Ceylon mountains.

2. Rhamnus hirsutus, *WA.*—A large shrub or small tree, generally scraggy, young branches pubescent spinescent, older ones glabrous whitish, leaves opposite or alternate ovate or lanceolate with a short sudden acumination, serrulate, membranaceous, nearly glabrous above, beneath hairy particularly on the nerves and veins, pedicels from the base of the young shoots 3-6 together pubescent, as long as the petiole, calyx 4 cleft, petals obovate obtuse entire flat, ovary 2-3-celled, styles 2-3 connected to the middle then diverging, the upper part jointed with and deciduous from the persistent lower half, fruit 2-celled, seeds plano-convex with a deep furrow at the base on the outer convex side. *WA. Prod. p.* 165.

Not uncommon on the slopes of the Nilgiris, Pulneys, Tinnevelly hills, and elsewhere on the western mountains of the Madras Presidency.

Analysis of Genera, Pl. X, fig. 6.

1. A portion of a branch in flower.
2. Under side of a leaf.
3. A flower.
4. Petal and anther removed.
5. Ovary and styles.
6. A flower cut open.
7. An ovary cut vertically.
8. The same cut horizontally.

All copied from Wight's drawing.

3. Rhamnus Arnottianus, *Gard. MSS.*—A small tree, young branches puberulous, leaves glabrous ovate-lanceolate to elliptic lanceolate, crenate, glandulosely serrulate, obtusely acuminate, depressedly-reticulated above, hairy in the axils of the lower veins beneath, 1½-2¾ inches long by ¾-1¼ inches broad, petioles channelled and puberulous on the upper side 2-4 lines long, stipules linear lanceolate 2½ lines long glandular at the base internally, early deciduous, but the glandular portion persistent, peduncles axillary tern puberulous 1-flowered about 7-8 lines long, calycine segments 4 acute externally pilose deciduous, stamens 4, filaments short, styles 2-3 combined at the base, fruit the size of a small pea, blackish-purple. *Thw. En. Pl. Zeyl. p.* 74.

A small tree inhabiting the most elevated parts of Ceylon.

SCUTIA. Comm.

Gen. Char.: Flowers hermathrodite, calyx 5 cleft, tube hemispherical or turbinate, lobes ovate thickened at the apex acute petals 5 unguiculate erect plane or cucullate, disk fleshy lining the tube of the calyx closely surrounding the ovary but not cohering with it, ovary ovoid or globose immersed in the disk free 2-4 celled, style short 2-4 fid, stigmas papillose obtuse, fruit obovoid or subglobose dry or slightly fleshy girt at the base by the persistent tube of the calyx, pyrenes 2-4 crustaceous angled or compressed, seed compressed, testa membranaceous or subcoriaceous, albumen none or thin, cotyledons plano-convex subfleshy glabrous. Shrubs unarmed or spinose, branches generally angled, leaves alternate approximated by pairs, or nearly opposite entire or serrulate, penninerved, stipules minute deciduous, flowers fascicled or congested in small axillary umbellules.

Scutia Indica, *Brong.*—A shrub armed with subopposite recurved prickles or sometimes almost unarmed, trunk short soon dividing into many long straggling sub-scandent branches, leaves sub opposite, distant, firm and shining, ovate orbicular or obovate, quite entire or serrulate, usually obtuse, or retuse at the apex with or without a mucro, sometimes acute ¾-1½ inches long, petioles 2-3 lines long, umbellules usually a little shorter than the petioles 5-12 flowered, calyx globosely campanulate, teeth deciduous in fruit, petals very small crescent-shaped emarginate, style very shortly 3-fid, fruit size of a pea. *Brong in Ann. Sc. Nat.* 10, 363 ;—*Wight. Ill. tab.* 73. S. Rheediana, *Wight. Icones tab.* 1071. Rhamnus circumscissa, *L. Roxb. Fl. Ind.* i. 603. Ceanothus circumscissa, *DC. Prod.* ii. 30 ;—*Rheede Mal.* 5. *t.* 30, 31.

A common shrub throughout the Madras Presidency and in Bombay and Ceylon.

Analysis, Pl. XI, fig. 1.

1. A bud.
2. A full flower.
3. Same forced open.
4. A petal and stamen.
5. A petal opened.
6. Anther, front and back view.
7. Ovary and style.
8. The same cut vertically.
9. The same cut horizontally.
10. A fruit.

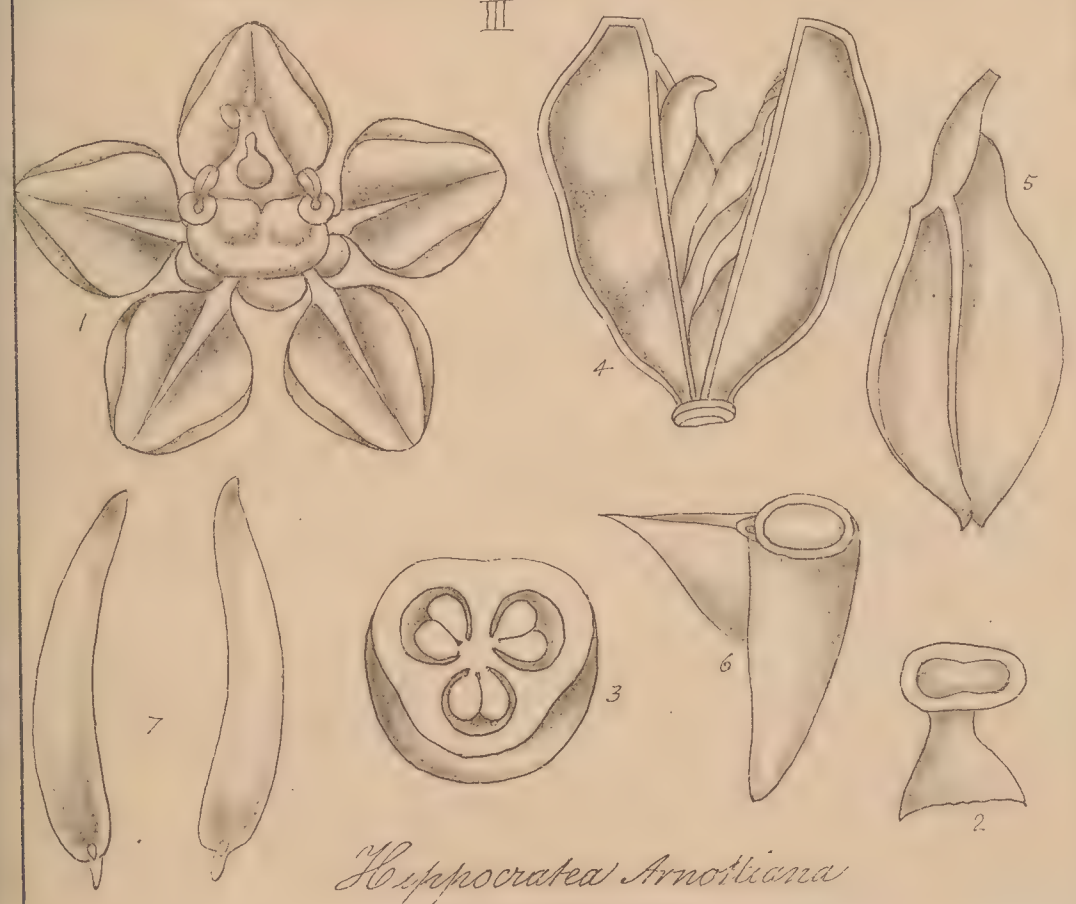
I

Pleurostylia Wightii

II

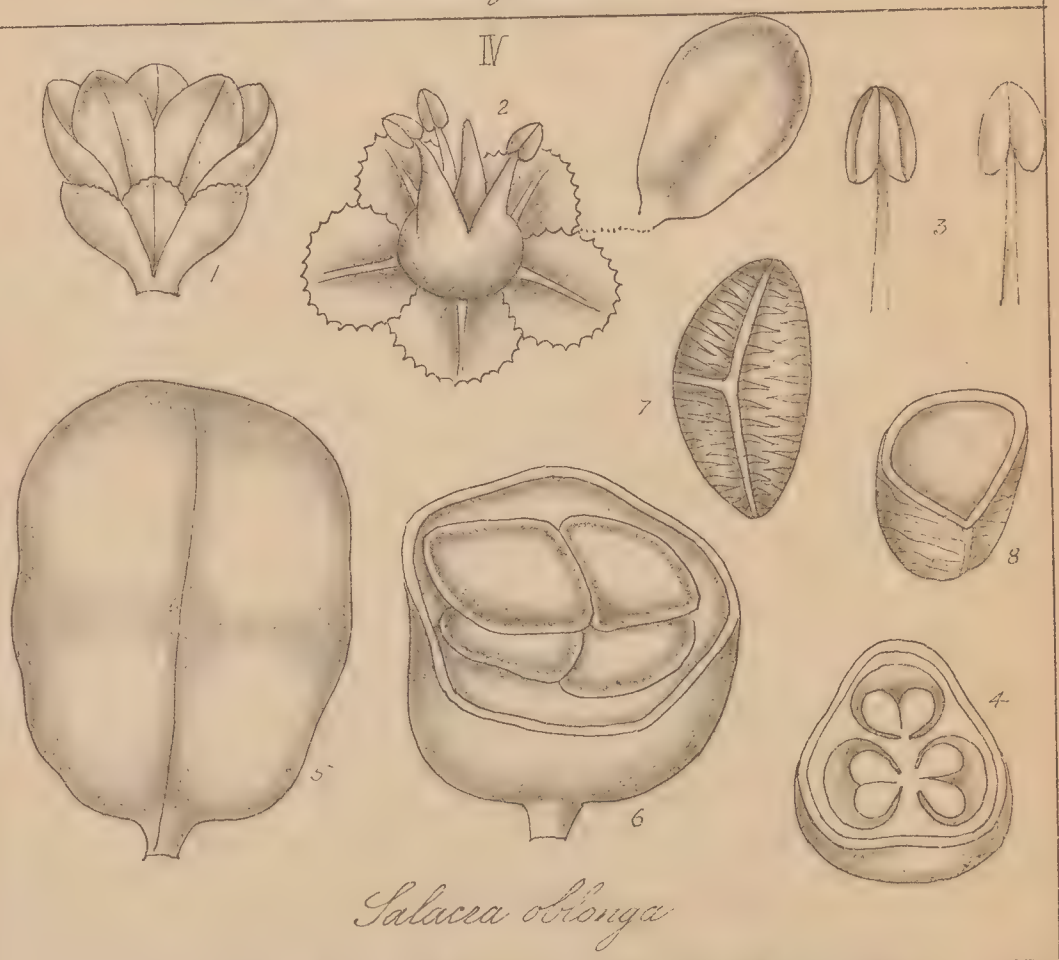
Celastrus Senegalensis

III



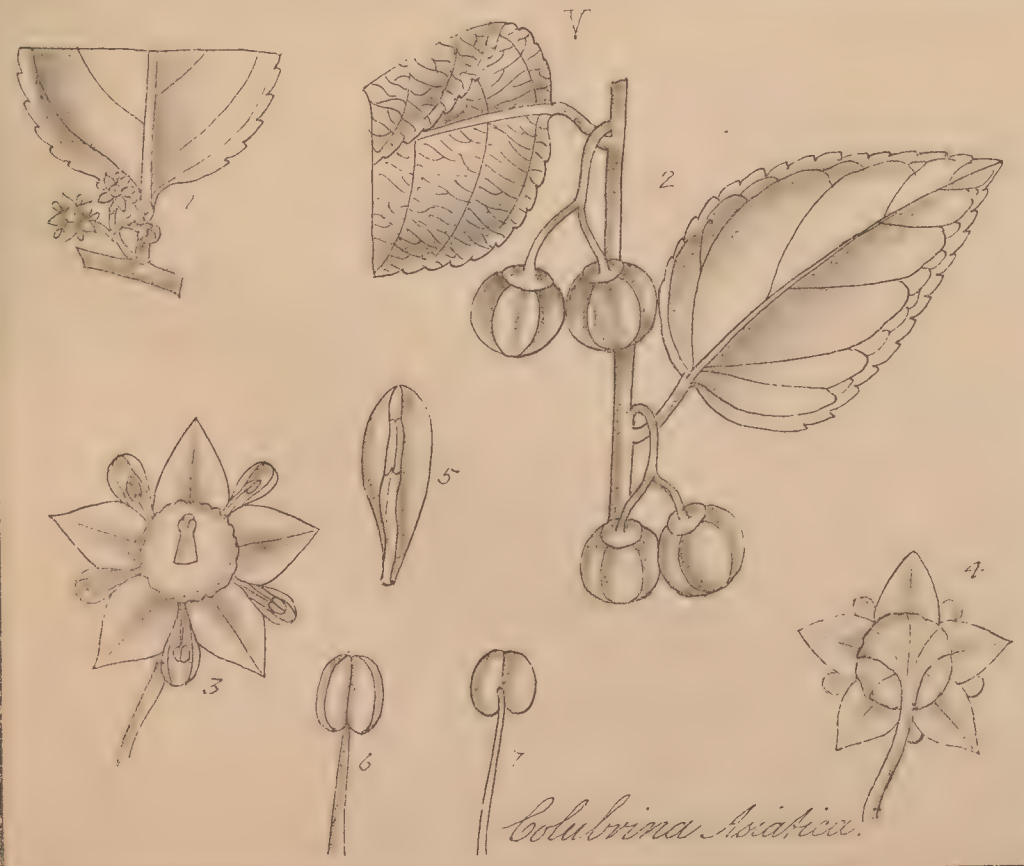
Hippocratea Arnottiana

IV



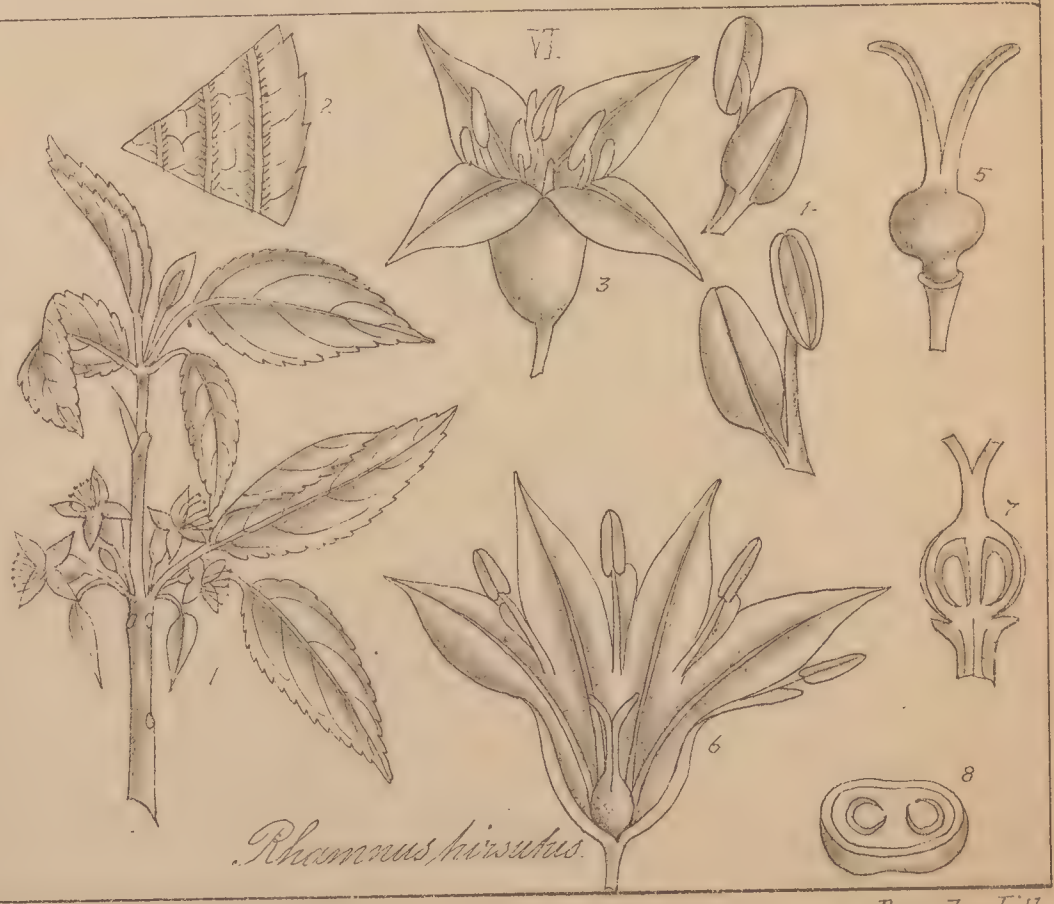
Salacea oblonga

V



Colubrina Asiatica.

VI.



Rhamnus hirsutus.

Dumphy Lith

ORDER XXX—SAPINDACEÆ.

Flowers usually polygamous, regular or irregular. Sepal 4-5, rarely 0 or more numerous, free or more or less connate, often unequal, usually imbricated, sometimes valvate. Petals 3-5, rarely 0 or more numerous, equal or unequal, the lower often absent or smaller than the rest, imbricated, usually bearded or furnished with a scale on the inner face. Disk various, complete or incomplete, sometimes 1-sided, rarely absent. Stamens 5-24, usually 8, usually inserted below the disk, sometimes unilateral, straight or declinate, sometimes inserted above the disk or round its base; the filaments usually elongated, filiform or subulate, often villose. Anthers oblong and didymous or linear and tetragonous, versatile or attached at the base. Ovary centrical or excentric, entire or more or less often deeply lobed, 1-4-usually 3-celled. Style terminal, simple or divided, straight or declinate, sometimes twisted; stigma usually simple. Ovules anatropal campylotropal, or amphitropal, usually solitary in the cells, ascending and affixed to the axis, with a usually ventral raphe and inferior micropyle, rarely horizontal or inverted, the funiculus usually tumid. Fruit capsular or indehiscent, drupaceous baccate or coriaceous, entire or lobed, rarely of 2-3 samaras, the valves dehiscing variously. Seeds globose or compressed, naked or arillate; testa various, often horny; albumen usually 0. Embryo usually thick, often plicate or spirally convolute. Cotyledons usually plano-convex, large and unequal, collateral or superposed; radicle short, inferior, mostly descending. Trees, rarely shrubs or herbs, sometimes climbing and cirrhiferous. Leaves generally alternate rarely opposite, usually without stipules, simple or compound, imparipinnate or equally pinnate. Inflorescence various. Flowers always small and inconspicuous. Fruit occasionally edible.

Sapindeæ.—Flowers usually polygamous, stamens inserted on to the disk, seed exalbuminous, leaves alternate (in all South Indian genera.)

* Flowers irregular either 1 petal fewer than the sepals or the stamens or disk unilateral and ovary excentrical.

Sepals 5, fruit 3-angled, leaves pinnate ... ...HEMIGYROSA.
Sepals 4, fruit deeply lobed into 1-3 cocci, leaves simple or 3-foliate ... ...SCHMIDELIA.

* * Flowers regular with a centrical disk.

a. Ovules solitary in the cells.

Fruit not deeply lobed or divided into cocci.

Calyx imbricate in 2 series ... ...ANOMOSANTHES.
Calyx valvate or subvalvate, petals 0, fruit ovoid ... ...SCHLEICHERA.
Calyx valvate, petals 5, fruit obscurely 3 lobed ... ...GLENNIEA.

Fruit lobed downwards or divided into 1-3 cocci.

Sepals broadly imbricate in two series... ... ...SAPINDUS.

Only with reference to this Flora.

In 3 species calyx segments much imbricate in 2 series, in 1 species valvate or subvalvate in 1 series petals 0, or when present furnished with scales, stamens 5-9, leaflets entire ... ...NEPHELIUM.
Calyx cup-shaped gamosepalous, teeth valvate, petals 5 without scales, stamens 5 very long in the male, leaflets serrate... ... ...POMETIA.
Calyx large 5 parted, lobes distinct imbricate or subvalvate. Stamens 6-8 in female, 8-10 in male ... ...EUPHORIA.

β. Ovules 2 in each cell.

Petals 4-5, leaves pinnate ... ...HARPULLIA.
Petals none, leaves simple (in the Indian species) ... ...DODONÆA.

Staphyleæ.—Flowers hermathrodite regular, stamens inserted under the margin of the disk, seed albuminous, leaves opposite. ... ...TURPINIA.

This order, which yields the Horsechesnut and the Maples (Acer) is abundantly represented in this Presidency and Ceylon, and yields 20 different indigenous trees and several shrubs. Hemigyrosa has 2 species, canescens, a common tree in many of our forests, and trichocarpa, a Ceylon species. Schmidelia has 4 trees with simple leaves peculiar to Ceylon, and 3 shrubs with trifoliate leaves very common in this Presidency. Anomosanthes 1 species, a rare tree. Schleichera 1 species, a very fine tree yielding a most valuable timber and very common in almost every forest. Glenniea 1 species, a tree peculiar to Ceylon. Sapindus (the soap nut) 3 species, all trees. Nephelium, two trees, stipulaceum, rather rare in our western moist forests, and bifoliatum peculiar to Ceylon, and two shrubs, erectum and simplicifolium, the former common both to our western forests and to Ceylon, and the latter only in the island. Pometia, a single species, a tree only found in Ceylon. Euphoria, 2 species, Longana, a fine tree common in our western forests and in Ceylon, and Gardneri, a closely allied species (but with toothed leaflets) peculiar to Ceylon; (the three latter genera are perhaps too closely allied, and Nephelium stipulaceum seems to connect that genus with Pometia). Harpullia, 1 species, a very beautiful tree common in our western forests and in Ceylon, and a beautiful object when covered with its red fruit. Dodonæa, 1 species, very abundant in the plains as a small shrub, but growing to a small tree on the mountains (at 7000-8000 feet elevation), and Turpinia, 1 species, a mountain tree. Little or nothing is known of the timber of many of the representatives. Schleichera yields a valuable wood, and some species of Sapindus and the Euphoria have serviceable timber. Euphoria Longana yields rather an agreeable fruit and Sapindus yields the soap nut.

The Horsechesnut (Æsculus Hippocastanum) has been introduced on to the Nilgiris, but will not make any growth. One Himalayan species of Acer (A. oblongum) introduced at Ootacamund, is a very beautiful evergreen tree and well worth attention, and the Himalayan Æsculus (Pavia Indica) would probably succeed. Nephelium Litchi and Nephelium lappaceum are 2 fruit trees which have been introduced from the eastward into a few gardens in this Presidency and Ceylon, and Blighia sapida (*Koenig*), a tree from tropical Africa, is common in Madras gardens, and Melianthus, a shrub introduced from the Cape, has run wild at Ootacamund. Of herbaceous genera not coming within the scope of this work, Cardiospermum is the only genus in Southern India, and it is represented by two herbaceous tendril bearing climbers.

HEMIGYROSA. BLUME.

For Gen. Char. see Plate cli.

1. HEMIGYROSA CANESCENS.—For description, &c. see Plate cli.

2. HEMIGYROSA TRICHOCARPA, *Thw.*—A middling sized tree, leaves abruptly pinnate subglabrous 12-16 inches long, leaflets subopposite 2-4 pair, lanceolate acuminate entire, 6-8 inches long by 2-2½ broad, petiolules 3-4 lines long, racemes tomentose more or

less branched, bracteoles subulate recurved longer than the pedicels, petals 4 (the 5th wanting), ovary hirsute 3 angled, style short, fruit hirsute 3 angled 3 celled, pericarp sublignose, seed oblong. *Thw. En. Pl. Zeyl. p.* 56.

Ceylon, from the plains up to 3000 feet ; the trees on the mountains have smaller and narrower leaves than those in the plains ; it is perhaps only a variety of the preceding. I have not very good specimens, but they show both subspherical and 3 angled fruit as in canescens, the bracteoles differ, and the only flowers that I possess are poor and all hermathrodite, but appear to differ in having the stamens unilateral, and only 4 petals. An analysis from good specimens may prove the 2 trees not more than varieties of 1 species.

SCHMIDELIA. Linn.

For Gen. Char. see Pl. clii.

1. Schmidelia hispida, *Thw.*—For description, &c. see Pl. clii.

2. Schmidelia allophylla, *Thw.*—A small tree, leaves simple lanceolate, oblongo-lanceolate to obovate, with a blunt acumination, glabrous, entire to grossly serrated or almost lobed towards the apex, 4-10 inches long by $1\frac{1}{2}$-$3\frac{1}{4}$ inches broad, petioles $\frac{1}{2}$-1 inch long, racemes shorter than the petioles hispid furnished with prominent bracteoles, berry roundish, red. *DC. Prod.* 1. 611 ;—*Thw. En. Pl. Zeyl. p.* 55.

A small tree, Ceylon, in the Ambagamowa and Hinidoon districts up to 3000 feet elevation.

3. Schmidelia varians, *Thw.*—A small tree, leaves simple glabrous elliptic lanceolate often more or less alcate, with a longish acumination, entire or slightly serrated and sometimes angled towards the apex, 4-6 inches long by $1\frac{1}{2}$-2 broad, petioles $\frac{1}{4}$-1 inch long, racemes elongate often as long or longer than the leaves, minutely pilose, fascicles of flowers few, bracteoles inconspicuous. *Thw. En. Pl. Zeyl. p.* 408.

A small tree, Ceylon, central provinces, 2000-5000 feet elevation.

4. Schmidelia acuminata, *Thw.*—A small tree, branches terete glabrous, leaves ovate obtuse, rostrato-acuminate glabrous 2-$4\frac{1}{2}$ inches long by 1-2 inches broad, petioles 4-7 lines long, racemes rather elongated subglabrous, sparingly flowered, the scales of the petals densely villous and about as long as the lamina. *Thw. En. Pl. Zeyl. p.* 55.

A small tree, Ceylon, on the banks of streams, 2000-3000 feet.

5. Schmidelia Cobbe, *DC., Wight. Icones*, 964-2 ; 6 Schmidelia serrata, *DC.* ; 7 Schmidelia Rheedii, *Wight Icones* 964—are small straggling shrubs with trifoliate leaves, very common throughout this presidency; they are all three closely allied, scarcely differing except in the amount of pubescence, and are probably all varieties only of one variable species.—Schmidelia villosa, *Roxb.* (Ornitrophe villosa, *Roxb. Fl. Ind.* ii. 265 ; *Wight Icones tab.* 401) is recorded from Ceylon but only considered by Dr. Thwaites as a variety of Cobbe, and it is probably the same variety that Wight figures as Rheedii.

ANOMOSANTHES. Bl.

Gen. Char. : Flowers polygamo-diæcious, sepals 5 unequal rotundate concave coriaceous, broadly imbricate, petals 5 equal orbicular glabrous furnished with scales at the base, disk thick annular glabrous, thinner on one side or emarginate ; stamens 8 regularly disposed round the ovary, filaments subequal villous, anthers oblong included glabrous, ovary hirsute or villous 3 angled 3 celled attenuated into a very short style, stigma subsessile entire or 3-lobed, ovules solitary in the cells. Fruit 3 angled, 3 celled villous, thickly coriaceous, indehiscent, seed fixed to the axis, exarillate compressed oblong, cotyledous subequal superposed. Trees glabrous or pubescent, leaves alternate exstipulate, pinnate, inflorescence racemose axillary or scattered on the older ramuli.

1. Anomosanthes deficiens, *WA.*—A tree, leaves abruptly pinnate, leaflets 6-7 pairs linear oblong lanceolate acuminate quite entire glabrous, 12 to 15 inches long, racemes axillary solitary or in pairs sometimes up to 2 feet in length, calyx unequal 5 parted, segments rounded, petals (the 5th wanting) nearly orbicular and glabrous, scales glabrous ? the apex rounded entire free and inflexed, disk incomplete unilateral, stamens 8 equidistant woolly, ovary villous ovate with a short thick oblique point, stigma large umbilicate nearly entire papillose above.—Sapindus ? deficiens, *WA. Prod. p.* 111 ;—*Wight Ill. p.* 141 ;—*Hook. and Benth. Gen. Pl.* 1, *p.* 402.

This tree was described by Dr. Wight from Peninsula specimens, and he also states that it occurs in Ceylon. I have never met with it, and Dr. Thwaites knows it not ; it must be strikingly distinct from any other Sapindaceæ, and if really a Peninsula species, must be very rare to have escaped observation. Dr. Wight gives no locality.

(Since writing the above and whilst this is passing through the press, I have found what I believe to be this tree on the South Tinnevelly hills, but only male specimens.)

SCHLEICHERA. Willd.

For Gen. Char. see letter press to Pl. cxix.

1. Schleichera trijuga, *Willd.*—For description, &c. see Pl. cxix.

On the Golcondah hills, Vizagapatam district, I met with a new tree which will probably turn out to be a species of Schleichera ; it was only in bud and quite too young for dissection. The following is a short description.

A middling sized tree, all the young parts and the inflorescence pubescent tomentose, leaves alternate abruptly or unequally pinnate 8-10 *inches long, leaflets* 2 3 *pair, with or without a terminal odd one, ovate or oblong with a longish acumination subentire or distantly and rather inconspicuously serrated, quite glabrous in age except the costa,* 3-4 *inches long by* 1-1½ *broad, petiolules* ¼-½ *inch long, racemes axillary panicled.*

Golcondah hills, close to the village of Guddem at nearly 3000 *feet elevation, in flower in March.*

GLENNIEA. Hook. fil.

For Gen. Char. see letter press to Pl. cliii.

1. Glenniea Zeylanica, *Hook. fil.*—For description, &c. see Plate cliii.

SAPINDUS. Linn.

For Gen. Char. see letter press to Pl. cliv.

1. Sapindus emarginatus, *Vahl.*—For description, &c. see Pl. cliv.

2. Sapindus laurifolius, *Willd.*—A stout shady tree with rather a straight trunk, branches numerous spreading, leaves alternate abruptly pinnate 8-14 inches long, leaflets 2-3 pair obliquely ovate to lanceolate, long taper pointed at the apex very unequally sided at the base entire shining and glabrous above, slightly puberulous or tomentose beneath, prominently reticulated particularly beneath, 3½-7½ inches long by 1½-3 broad, petiolules 2-3 lines broad, panicles terminal much branched clothed with a rather golden pubescence, bractes minute, flowers numerous small dull whitish, calyx and corol 5 leaved, petals pubescent outside and equally woolly over the whole of the inner face or sometimes furnished with 2 hairy glandular appendages, fruit with 3 cocci each the size of a cherry, soft when ripe and of a greenish yellow color and slightly hairy. *Roxb. Fl. Ind. vol.* ii. *p.* 278.

A handsome tree, not uncommon throughout this Presidency, and in Mysore, Bengal, Bombay, Birmah, and Ceylon ; it has the same properties as S. emarginatus, and is known by much the same names.

3. Sapindus rubiginosus, *Willd.*—A large timber tree with a straight trunk of considerable height and thickness, branches numerous spreading, branchlets, petioles, costa of the leaflets and panicles clothed with dense rusty or golden pubescence, leaves alternate abruptly pinnate with the petiole ending in a downy bristle 12-14 inches long, leaflets 4-6 opposite or subopposite pair, obliquely lanceolate entire gradually attenuated into a point at the apex and very unequal sided at the base, glabrous above except the costa, and glabrous or more or less pubescent beneath, 4-6 inches long 1-2 broad, panicles terminal or from the upper axils, composed of simple racemes, bractes numerous very villous, calyx 5 leaved, petals 4 (the fifth deficient) each with a woolly scale, disk unilateral, stamens 8 on one side, fruit with 1-3 oblong cocci. *Roxb. Fl. Ind.* ii. *p.* 282 ;—*WA. Prod. p.* 112.

My specimens are too imperfect for an analysis of the flowers.

I have only met with this tree in the Godavery forests and the forests of our northern division, and I do not think it occurs on the western side of the Presidency. Roxburgh says that the timber is strong and durable, chocolate colored towards the centre, and useful for a great variety of purposes, and he gives as the Teligu name Ishee rashee.

NEPHELIUM. Linn.

Gen. Char. : Flowers regular polygamous. Calyx (described in the *Genera Plantarum* as cup-shaped with 4-6 valvate or subvalvate lobes), in 3 of the following species it is imbricate in 2 series, in the 4th (stipulaceum) it is 5-6 partite with the lobes distinct or nearly distinct valvate or subvalvate, petals 0, or as many as the calyx, lobes small furnished with scales inside ; disk annular, stamens 5-10 inserted within the disk, filaments short (or elongate), ovary 2-3 celled usually lobed with 1 ovule in each cell. Style with 2-3 stigmatic lobes, fruit deeply 2-3 lobed or entire 2-3 celled or reduced to a single carpel, the lobes indehiscent or 2 valved or opening irregularly muricate or smooth ; seeds usually wholly or partially enclosed in an arillus, testa coriaceous, cotyledons thick. Trees, leaves generally abruptly pinnate; simple in one species, leaflets opposite or alternate, entire in all the species of this Flora ; flowers small in axillary or terminal panicles.

Not liking to alter the arrangement of the *Genera Plantarum* or Dr. Thwaites' classification with reference to Nephelium, Euphoria, and Pometia, I have kept these 3 genera distinct, and as I find them, but I feel pretty certain that they must be united, at least the 2 former.

Nephelium is described as having long stamens much exserted, and cup-shaped calyx with valvate or nearly valvate teeth.

Euphoria as having included stamens, and a 5-parted calyx, the lobes valvate or imbricate, and entire leaflets.

Pometia as having a cup-shaped calyx with valvate teeth and long exserted stamens and stipuliform lower leaflets.

In Nephelium bifoliatum, erectum and simplicifolium, the calyx segments are broadly imbricate in 2 series, and the stamens included or nearly so ; they would therefore appear to belong rather to Euphoria than to Nephelium, but Dr. Thwaites places them in Nephelium ; and this is passed by the authors of the *Gen. Plant.*

In the apetalous N. stipulaceum, the calyx is 5-parted quite or almost quite to the base in a single series, lobes subvalvate or valvate as in Euphoria, but the segments small ; it has short stamens, the lower stipuliform leaflets of Pometia, and all its leaflets entire ; it seems to unite Pometia and Euphoria.

In Euphoria Longana I find the stamens in the male flowers long and exserted, and in the female flowers short; the same occurs in Pometia.

In Euphoria Gardneri the leaflets are toothed.

From the above it appears that the 3 genera should be united : the present classification at least cannot stand.

1. Nephelium stipulaceum, *Bedd.*—For description, &c. see Pl. clv.

2. Nephelium bifoliatum, *Thw.*—A middling sized tree, 20-30 feet, much branched, leaflets 1 pair entire lanceolate rather obtuse at the apex, narrowed at the base, glabrous shining above reticulated, opaque beneath, 3-5 inches long, $\frac{3}{4}$-$1\frac{1}{2}$ broad, petiolules 2-3 lines long, petiole $\frac{1}{2}$-1 inch long, panicles terminal or from the upper axils as long or a little longer than the leaves, slightly pilose, flowers 5-merous, calyx-segments much imbricate in 2 series rounded glabrous ciliate ; petals a little longer oblong glabrous ciliate abruptly and shortly unguiculate furnished at the base with hairy scales, disk fleshy crenulate, stamens generally 7, in the male filaments as long as the petals pilose at the base, in the fertile shorter encircling the ovary, style linear, stigma minute bilobed.

A tree only known in Ceylon, Lower Bundulla road from Kandy, at no elevation, in flower in April.

3. Nephelium erectum, *Thw.*—A large erect shrub about 10 feet high, not or only slightly branched, leaves abruptly pinnate with the striated petioles terminating in a longish bristle, 10-18 inches long, leaflets 3-5 opposite or subopposite pair, lanceolate with a long fine acumination entire glabrous on both sides reticulated, 6-10 inches long by 2-$3\frac{1}{2}$ broad, petiolules 2-3 lines long, panicles terminal many flowered much shorter than the leaves hoary, flowers 5-merous, calyx segments rounded much imbricate in 2 series, petals obovate-spathulate with a long claw and a hairy bifid scale just above the claw, disk smooth annular lobed, stamens 8, style short, stigma 3 lobed, fruit fleshy yellowish 1-3-rarely 4-lobed minutely tomentose, lobes oblong about 1 inch long, seed ovoid covered with a fleshy entire aril, testa membranaceous red. *Thw. En. Pl. Zey. p.* 57.

A common shrub in Malabar, the Anamallays, and elsewhere on our Western ghats at an elevation of 2-3000 feet, very common on the Carcoor ghat, also found in Ceylon.—From an elevation of 5000 feet on the Anamallays, I have a mountain form of this growing to a small tree, its leaves and leaflets are much smaller and the latter are shortly and obtusely pointed at the apex, the petioles are purplish brown and the petiolules and costa of the leaflets beneath are slightly hairy, the flowers are larger and the panicles quite velvetty, it does not otherwise differ, and I only consider it a high level form of Dr. Thwaites' *erectum.*

4. Nephelium? simplicifolium, *Thw.*—An erect shrub 6-10 feet, sparingly branched, leaves simple, entire, cuneato-lanceolate, acuminate, smooth membranaceous reticulated, 8-12 inches long by $2\frac{1}{2}$-4 inches broad, petiole $\frac{1}{2}$-2 inches long, panicles short subterminal, minutely tomentose. Male flowers 5-merous, calyx segments rotundate, petals exunguiculate rounded ciliate furnished with a small villous scale at the base, disk regular smooth, stamens 8 encircling the 3-lobed rudiment of an ovary, female flowers and fruit unknown. *Thw. En. Pl. Zey. p.* 57.

Ceylon, south of the island, at no great elevation, rare.

Nephelium Litchi (the Litchi) and Nephelium lappaceum (the Rambutan), 2 fruit trees, have been introduced into gardens in India and Ceylon from China and the Straits.

POMETIA. Forst.

For Gen. Char. see letter press to Pl. clvii.

1. Pometia eximea, *Thw.*—For description, &c. see Pl. clvii.

EUPHORIA. Juss.

For Gen. Char. see letter press to Pl. clvi.

1. Euphoria Longana, *Roxb.*—For description, &c. see Pl. clvi.

2. Euphoria Gardneri, *Thw.*—A tree, leaves abruptly pinnate subglabrous, leaflets 2-3 pair lanceolate distantly deeply and obtusely toothed shortly petioluled, glaucous beneath, very similar to E. Longana, but differing in its toothed leaflets and more acute sepals and petals. *Thw. En. Pl. Zeyl. p.* 58.

A tree only known in Ceylon.

HARPULLIA. Roxb.

For Gen. Char. see letter press to Pl. clviii.

1. Harpullia imbricata, *Bl.*—For description, &c. see Pl. clviii.

DODONÆA. Linn.

Gen. Char. : Flowers unisexual or polygamo-diœcious. Sepals 2-5, imbricate or valvate. Petals 0. Disk obsolete in the male flowers, small in the female ones. Stamens 5-8 centrical, the filaments very short, the anthers linear-oblong, obtusely tetragonous. Ovary sessile, with 3-6 angles and 3-6 cells. Style 3-6 angled, 3-6 fid at the apex. Ovules 2 in the cells, collateral or one above another, ascending or the upper one pendulous. Capsule membranous or coriaceous, 2-6 angled, the cells 1-2 seeded, the angles obtuse

or acute or winged on the back, septicidally 2-6 valved, the valves frequently winged on the back, the septiferous column remaining attached after the part that bears the seeds falls. Seeds lenticular or subglobose, exarillate, the hilum sometimes excavated, the funiculus thickened, the testa crustaceous or coriaceous. Embryo spirally twisted. Trees or shrubs.—Empleurosma, *Bartl.*

1. Dodonæa viscosa, *Linn.*; *DC. Prod.* i. 616.—A shrub or small tree, the ultimate branches slender, often subtriquetrous glabrous, more or less viscid. Leaves simple, oblanceolate, 2-4 inches long, ¼-1 inch broad, the apex blunt or subacute, the lower part narrowed very gradually to the base, the edge entire; texture membranous or slightly coriaceous, more or less viscid, the veins not raised. Flowers in 6-20 flowered terminal panicles, the ultimate pedicels slender, glabrous, ½-¾ long. Sepals glabrous, ligulate-oblong, 1 line long. Capsule ⅜-⅝ inch deep, with 3 broad, glabrous, membranous wings cordate at both ends.—D. Burmananiana, *DC.* D. angustifolia, *Roxb. Fl. Ind.* ii. *p.* 256,

A very common plant all over India and universally distributed through tropical and south temperate regions. In this Presidency it is never more than a shrub in the plains, and in that state often covers large maidans to the exclusion of almost every other plant; it ascends the mountains to 8000 feet, and is there often met with as a tree of 8-10 inches in diameter and 20 feet high; the wood is of a bright yellow color and exceedingly hard and tough close grained and elastic, it is used for wood engraving and turnery, also for tool handles and walking sticks; the plant is sometimes used for hedges; it is called Bhandaru by the Burghers on the Nilgiris.

Analysis of Genera, Pl. XI, Fig 2.

Dodonæa viscosa.

1, 2 & 3. Hermathrodite flowers, with the female organs most developed.
4. Anthers, front and back view.
5 & 6. Hermathrodite flowers with the male organs most developed.
7 & 8. Dissection of the ovary from the female hermathrodite.
9, 10 & 11. Ditto from the male hermathrodite.
12 & 13. The fruit.

TURPINIA. Ventn.

For Gen. Char. see letter press to Pl. clix.

1. Turpinia Nepalensis. For description, &c. see Pl. clix.

In North India the following 5 genera occur, which are unknown in the Peninsula. Acer, Æsculus (Pavia), Dobinea, Stocksia, and Staphylea; the 2 former yield trees, the others only shrubs.

Analysis of Genera. Pl. XI. Fig. 6.

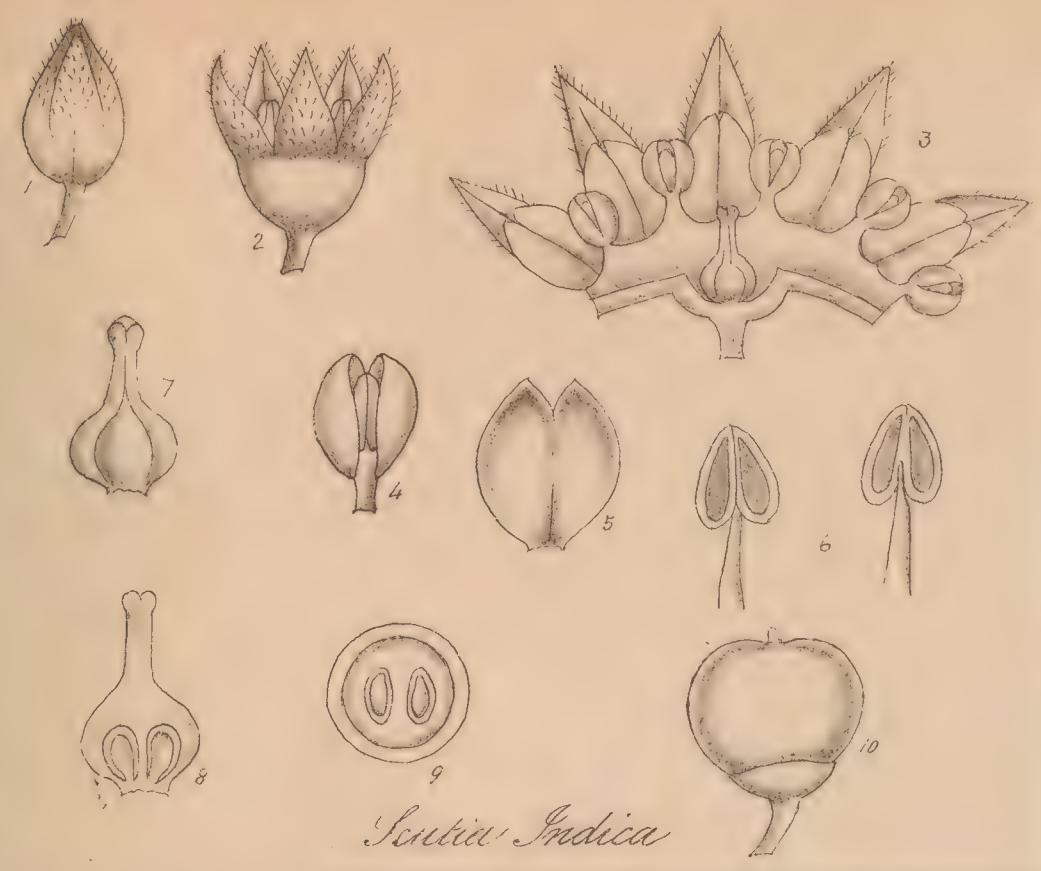
Heritiera littoralis (vide Manual, p. xxxiii).

1. A bud.
2. A flower.
3. A 5-merous female flower opened, showing the 5-toothed calyx and 5 ovaries.
4. A 4-merous female flower opened.
5. Ovaries removed from a 5-merous flower.
6. A single ovary cut vertically, showing the position of the 2 ovules.
7. A 4-merous male flower.
8. The column of stamens.

Note.—Not having specimens for analysis when drawing up the Manual, I copied Mr. Bentham's description which describes the flowers as always 5-merous, and the ovaries as 1 ovuled. In dissecting flowers lately to hand, I find them just as often 4-merous, and the ovules always 2 collateral, the latter probably vary and the character should be altered in the Manual as follows: "Calyx 4-5 toothed or cleft, ovaries 4-5 nearly distinct 1 ovulate or with 2 collateral ovules ascending from near the base of the axis."

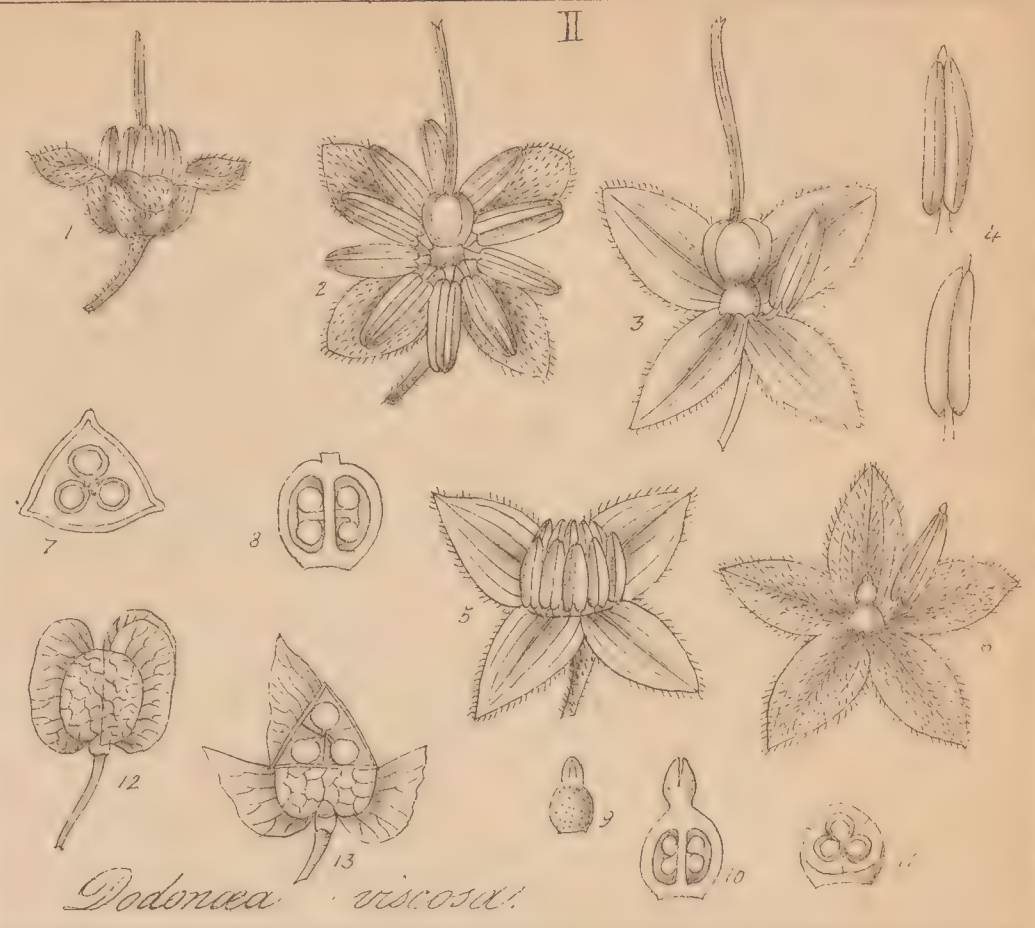
Rhamneæ Sapindaceæ Anacardiaceæ Connaraceæ Sterculiaceæ.

I



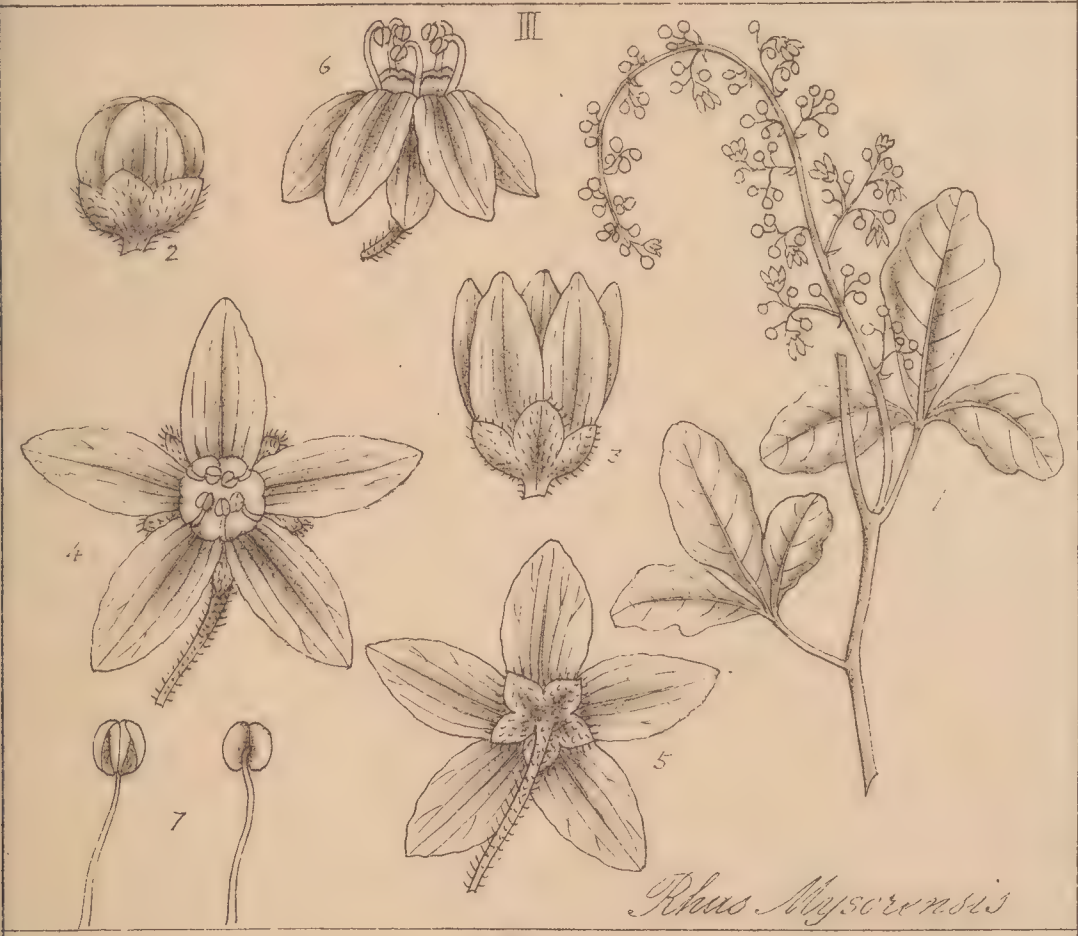
Scutia Indica

II



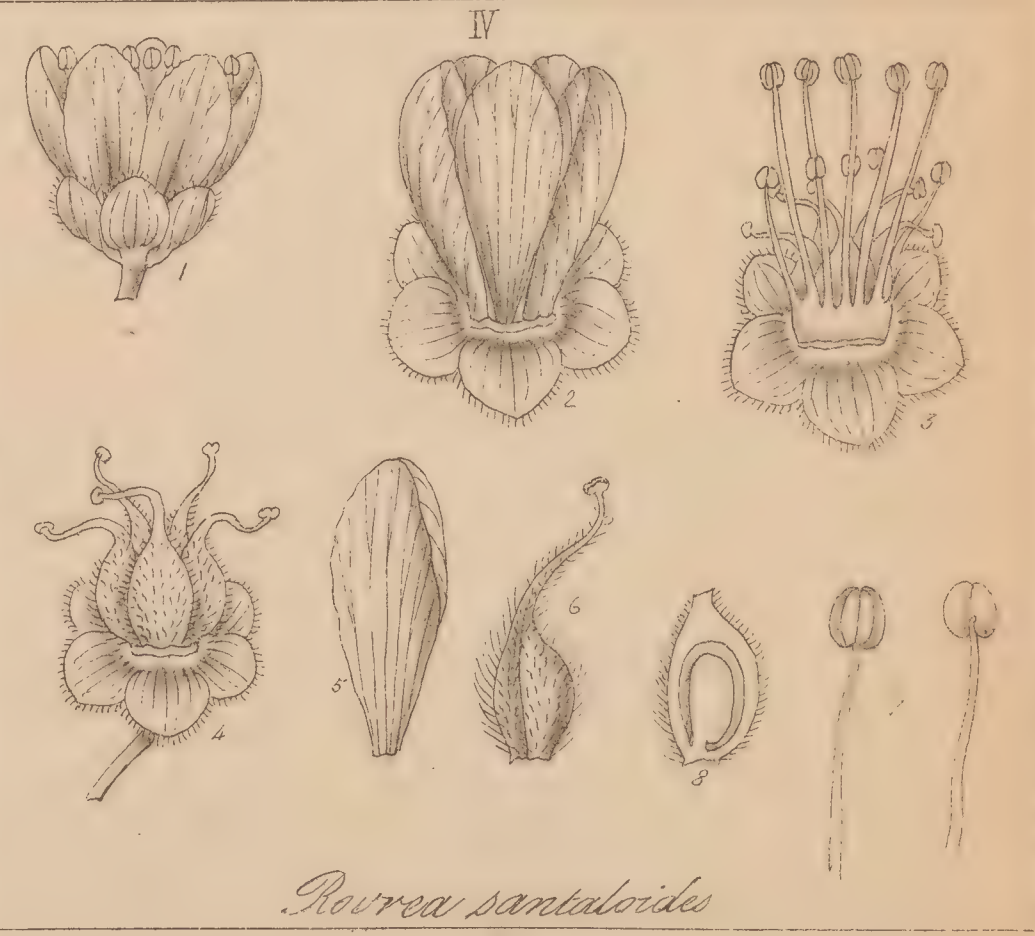
Dodonæa viscosa.

III



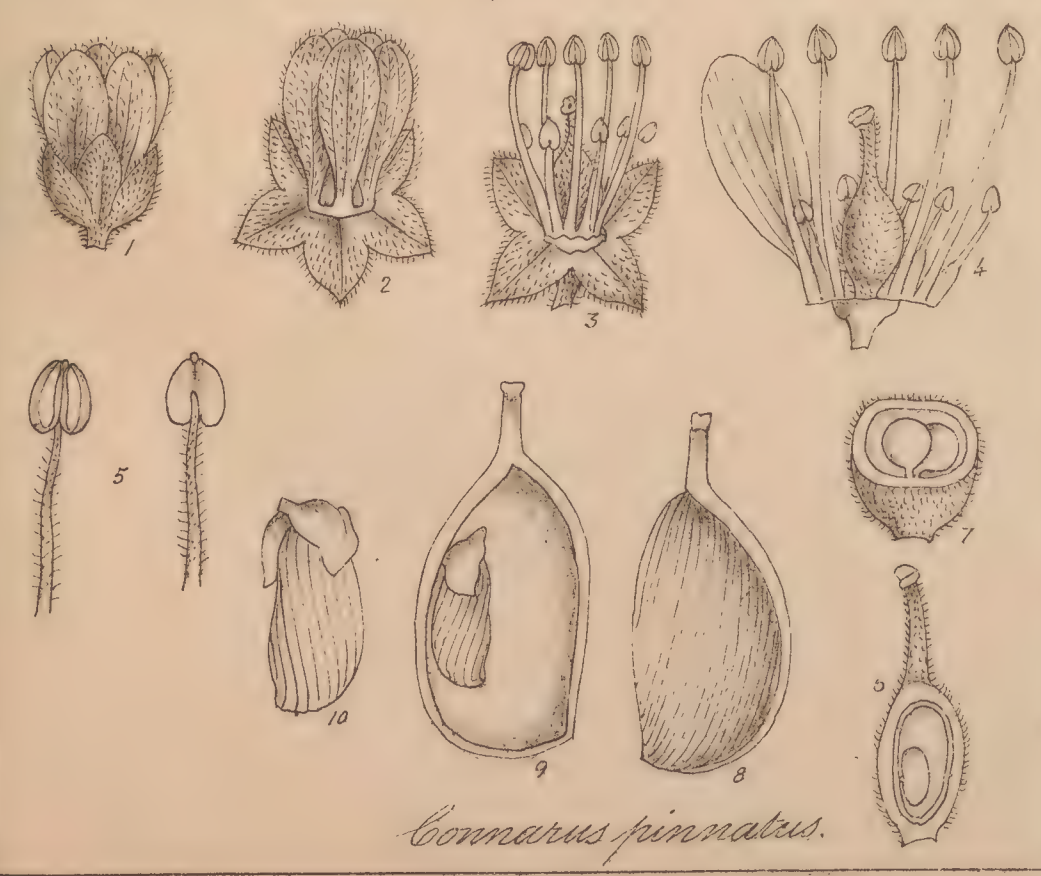
Rhus Meyeriensis

IV



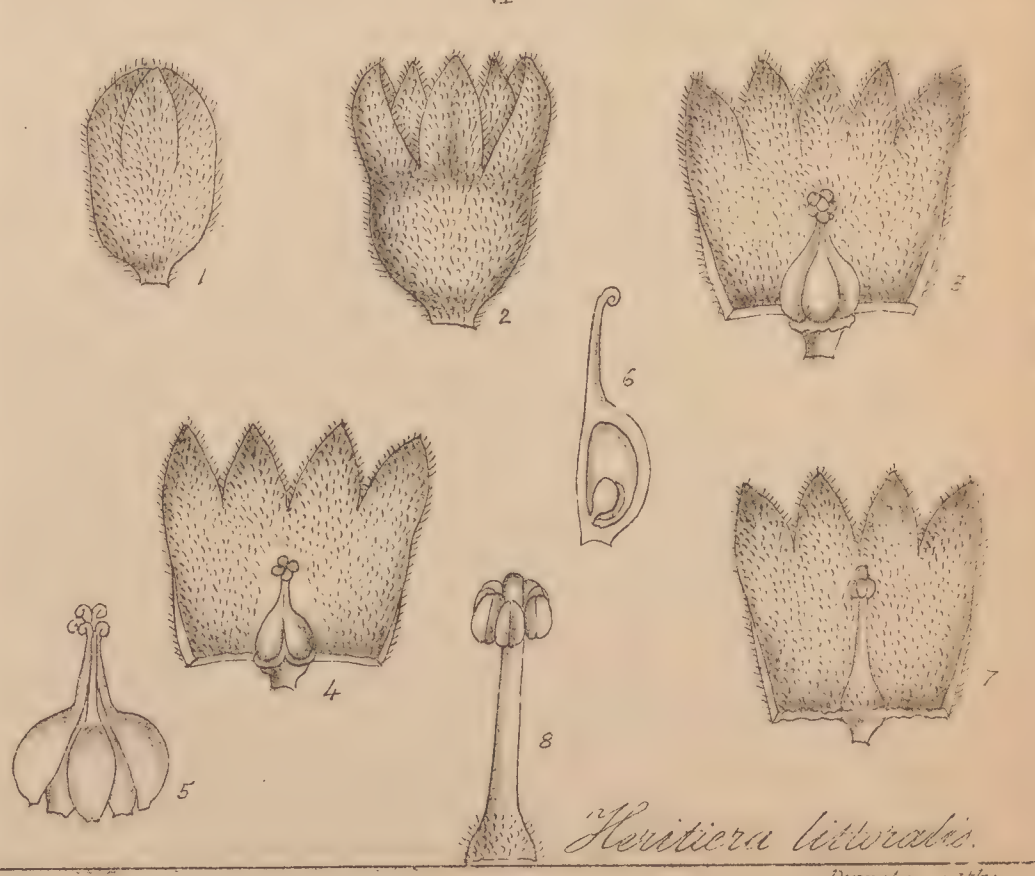
Rourea santaloides

V



Connarus pinnatus.

VI



Heritiera littoralis.

Dampier. Litho.

ORDER XXXI—SABIACEÆ.

Flowers hermathrodite or polygamo-diæcious, calyx 4-5 parted imbricate, petals 4-5 equal or unequal, opposite or alternate with the sepals, imbricate, disk small annular lobed rarely raised. Stamens 4-5 placed at the base of the disk or on the torus, opposite the petals, free or cohering with the petals, rarely all equal and fertile, filaments thick, generally 2 perfect opposite the smaller interior petals, and 3 sterile often squamiform, the filaments of the perfect ones being clavate or obcuneate. Anthers didymous dehiscing by a transverse slit or deciduous lid, connective thick, pollen minute globose, ovary sessile 2-3 celled compressed or 2-3 lobed, styles combined into 1 or slightly distinct stigmatose at the apex, ovules 1-2 in each cell superposed or collateral horizontal or pendulous, raphe ventral, micropyle inferior or remote from the hilum, fruit-carpels 1-2 drupaceous or dry, indehiscent, generally subglobose and the apex deflexed, in Sabia compresso-reniform, endocarp crustaceous or bony 1-seeded, seed compressed or globose fixed to the base of the cell with a broad hilum, testa membranaceous or coriaceous, embryo albumen none or extremely thin, cotyledons thickish, rugose or membranaceous conduplicate, radicle inferior deflexed the apex ascending towards the hilum.

This order is only represented in India by 2 genera, Meliosma and Sabia, the former yields 3 trees very common in S. India, and the latter one climbing plant.

MELIOSMA. Blume.

For Gen. Char. see letter press to Pl. clx.

1. Meliosma Arnottiana, *Wight.*—For description, &c. see Pl. clx.

2. Meliosma pungens, *Wall.*—A large tree, young branches covered with dense rusty pubescence, leaves simple coriaceous lanceolate attenuate at the base coarsely and distantly toothed or sub-entire, glabrous above except the costa, densely pubescent on the costa and all the veins beneath and in the axils of the primary pinnate veins, 6-9 inches long by 2-2½ broad, petioles 8-12 lines long, panicles rigid terminal and from the upper axils densely covered with rusty pubescence, rachis terete, calyx with 3 pubescent bracteoles, sepals ciliate but glabrous subequal or unequal, the rest as in the generic character, flowers cream-colored, fruit size of a pea.—Millingtonia pungens, *Wall. in W A. Prod. p.* 115 ;—*Wight. Icones. tab.* 964. 3. *(very characteristic.)*

A most common tree in the shola forests about Ootacamund and other mountainous tracts on the west side of this Presidency, and in Ceylon, at and above 5,000 feet elevation. The tree is called by Europeans on the Nilgiris *the Hill Mango*, and at the distance it has somewhat the appearance of a mango when in blossom ; it is called Tode by the Burghers. The wood is useless and not even cut as firewood, as it burns very badly ; the tree is said to be held sacred by the Todas. A drawing of the male and hermathrodite flowers is given in Plate clx.

3. Meliosma simplicifolia, *Roxb.*—A good sized tree, leaves alternate simple membranaceous oblong lanceolate much and gradually tapering towards the base entire or remotely sub-serrate, in young plants often completely serrate, costa and veins beneath sub-pubescent otherwise quite glabrous on both sides, 6-12 inches long by 3-4 broad, primary veins very prominent beneath incurved and confluent towards the margin, petioles about 1 inch long, panicles terminal and from the upper axils slender lax pubescent, rachis winged, flowers very minute yellowish white. Calyx not bracteoled, sepals unequal ciliate, ovary cells 2-ovuled, drupe size of a pea nearly round smooth black. *Roxb. Fl. Ind.* ii. *p.* 103.

A very common tree in the moist subalpine forests on the western side of the Madras Presidency at 2000-3000 feet elevation also in Ceylon and Bengal. I have not observed it much above the latter elevation, its place being then taken by *pungens.*

ORDER XXXII—ANACARDIACEÆ.

Flowers hermathrodite polygamo-diæcious or unisexual usually regular. Calyx 3-7-fid or partite, rarely spathaceous or irregularly splitting (in Gluta), inferior rarely semi-superior (Holigarna), the base of the tube rarely accrescent (Semecarpus) (or the limb accrescent in a Malay and Andaman genus), petals 3-7 (rarely 0, or accrescent after flowering in genera not Indian), disk usually annular or broad rarely stipitiform (Gluta), stamens of the same number or twice as many as the petals (rarely numerous in genera not Indian) inserted round the disk or rarely upon it, all polleniferous or some sterile, filaments free, or rarely connate with the torus (Gluta), anthers versatile, ovary in the fertile flowers superior, rarely semi-inferior (Holigarna), usually 1-celled, but in the Spondieæ 2-6 celled (many celled in 1 Australian species), and in Buchanania of several distinct carpels, in the male flowers 0, rudimentary or 3-5 fid, styles 1-6 (many in 1 Australian species), ovules solitary in each cell, pendulous or suspended from a funicle which arises from the base of the cell or from its side below the middle, micropyle inferior, raphe dorsal, (very rarely, in genera not Indian, erect with a ventral raphe and inferior micropyle), fruit superior, or in Holigarna semi-inferior, free or adnate at the base to the enlarged calyx-tube or disk, or to an enlarged drupe-like peduncle (in Anacardium), 1 celled or (in Spondieæ) several celled, usually drupaceous and indehiscent, or sometimes with a 2 valved putamen, seed erect horizontal or pendulous, albumen none or very thin, embryo straight or incurved, cotyledons usually plano-convex and fleshy, radicle short straight or incurved superior or inferior. Trees or rarely only shrubs, the leaves often only at the apex of the branches, the bark often and sometimes the fruit exuding a caustic balsamic or gummy juice, leaves alternate (rarely opposite in a Birmese genus "Bouea") exstipulate, the petioles in 1 genus (Holigarna) furnished with a pair of setiform stipels, simple, 1-3 foliate or unequally pinnate usually without glandular dots. Inflorescence various usually paniculate with small flowers.

This order is distinguished from the neighbouring orders by its solitary ovules with a ventral raphe and inferior micropyle, or dorsall raphe with a superior micropyle, but it is closely allied to Juglandeæ amongst Monochlamydeæ. Connaraceæ differ in having 2 erect orthotropa-ovules and distinct carpels. Burseraceæ in having 2 ovules with a superior micropyle and ventral raphe. Rutaceæ in the number and disposition of the ovules and in its leaves being pellucidly punctate. Sapindaceæ in the stamens being usually within the disk and the ovary 3-5 celled. Sabiaceæ in the stamens being opposite the petals and the ovules twin.

An order of considerable importance to the Indian forester, all its representatives being trees of considerable size except the Rhus and 1 species of Semecarpus which are only shrubs. Mangifera (the Mango), Spondias (the Hog-plum), Gluta, Solenocarpus, Odina and Holigarna, each yield a single species and inhabit our forests (chiefly hill tracts), the mango also being every where cultivated for its fruit and the Odina as an avenue tree. Anacardium (the Cashew nut) is also represented by 1 species very common throughout the Presidency in the vicinity of the sea, but it is an introduction from America. Campnosperma is represented by 1 species in Ceylon only. Semecarpus (the Marking nut) has 13 species, 3 in this Presidency and 10 distinct species peculiar to Ceylon. Buchanania and Nothopegia are each represented by 2 or 3 species, the former throughout the Presidency, the latter on the west side only.

Besides the following genera Papiria and Drimycarpus occur in Northern India, and Bouea (the Mangifera oppositifolia of Roxb.) in Birmah, but none of these occur in the Peninsula. Rumphia, Linn., is a genus founded on Rheede's figure of a Malabar tree with 3-merous flowers and 3-celled 3-seeded fruit and simple aromatic leaves (it was found at Parakaru and other provinces in Malabar). I have looked in vain for this tree, but it probably does not belong to this order and may be an indifferent figure of some well known tree.

Ovary 1 celled (Anacardieæ.)

* Ovule suspended from a funicle which arises from the base or rarely (in Mangifera) from the side of the cell below the middle.

Leaves 3 foliate, petals 4-6 imbricate, styles 3 ... ...RHUS.

Leaves simple.

Calyx 4-5 partite, st. 4-5, only 1 (rarely 2) fertile ... ...MANGIFERA.
Calyx 5 partite, st. 8-10, all or only 1-4 fertile, style filiform ... ...ANACARDIUM.
Calyx spathaceous, st. 4-6, style lateral filiform ... ...GLUTA.
Calyx 4-lobed, st. 4 all fertile, style terminal short .. ..NOTHOPEGIA.
Calyx 3-5 toothed, st. 10, all fertile, style terminal short .. ..BUCHANANIA.

* * Ovule suspended from the apex or above the middle of the cell.

Leaves pinnate.

Petals valvate, st. 10, style 1 ... ...SOLENOCARPUS.
Petals imbricate, st. 8-10, styles 3-4 ... ...ODINA.

Leaves simple.

Petals 5, st. 5, syles 3, drupe superior ... ...SEMECARPUS.
Petals 5, st. 5, styles 3, drupe inferior... ... ...HOLIGARNA.
Petals 3, st. 6, style 1, drupe superior ... .CAMPNOSPERMA.

Ovary 2-6 celled (Spondieæ)

St. 8-10, styles 4-6 free at the apex ... ...SPONDIAS.

RHUS. LINN.

Gen. Char. Flowers polygamous. Calyx small, of 4 to 6, usually 5, imbricate sepals. Petals as many as sepals, imbricate in the bud. Disk broad, flat or annular. Stamens as many as petals or rarely 10, inserted round the base of the disk. Ovary 1-celled, styles 3, free or connate, with simple or capitate stigmas, ovule suspended from an erect filiform funicle. Drupe globular or compressed, usually small. Seed inverted or transverse, the radicle turned upwards. Trees or shrubs. Leaves pinnate, 3-foliate, or simple. Flowers small, in terminal or axillary panicles.

1. RHUS MYSORENSIS, *Heyne.*—A good sized shrub, branches often spinescent, young ones petioles and panicles more or less pubescent, leaves palmately trifoliate 1-2 inches long, leaflets obovate, retuse, sinuate-lobed, sub-glabrous above, pubescent beneath, lateral ones rhomboid very much smaller than the terminal one, panicles terminal or axillary, much longer than the leaves, disk concave glabrous with the stamens inserted under its margin, style distinct each with a capitate stigma, fruit globose. *Heyne in Herb. E. I. C.;—WA. Prod. p.* 172.

A common shrub in dry subalpine jungles all over the Presidency, rarely a small tree; the specimen figured is from the Vellore hills.

Analysis, Pl. XI, Fig 3.

1. Flowering branch (male) life-size.
2. A bud.
3. A flower showing the imbricate petals.
4. A male flower opened showing the disk and stamens.
5. The same, back view.
6. The same, side view.
7. Anthers, front and back view.

MANGIFERA. LINN.

For Gen. Char. see letter press to Pl. clxii.

1. MANGIFERA INDICA, *Linn.*—For description, &c. see Pl. clxii.

ANACARDIUM. ROTTB.

For Gen. Char. see letter press to Pl. clxiii.

1. ANACARDIUM OCCIDENTALE, *Linn.*—For description, &c. see Pl. clxiii.

GLUTA. Linn.

For Gen. Char. see letter press to Pl. lx.

1. Gluta Travancorica, *Bedd.*—For description, &c. see Pl. lx.

NOTHOPEGIA. Blume.

Gen. Char. Flowers polygamous, calyx small 4 lobed persistent, petals 4 patent-recurved imbricate, disk annular 4 lobed, stamens 4, inserted into the margin of the disk, filaments free, ovary free sessile ovoid 1-celled, style very short, stigma simple, peltate, ovule 1 pendulous from a funicle which rises from the base of the cell, drupe depressedly globose fleshy, striated, apiculated with the style, putamen crustaceous, cotyledons thick plano-convex, radicle very short sublateral. A glabrous tree, leaves alternate petiolate, coriaceous entire glaucous beneath racemes axillary subsimple shorter than the leaves, flowers small bracteated white, drupe purple. *Bl. Mus. Bot.* 1-203 ;—*Benth. and Hook. Gen. Pl.* 1. *p.* 425. Glycicarpus, *Dalz. in Hook. Kew. Journ.* ii. 38.

Unless the single described species is a very variable one, I have 2 or perhaps 3 different species from our western forests, but all my specimens of this genus were lately sent to Kew and have not yet been returned, so that I have none by me for comparison or analysis.

1. Nothopegia Colebrookiana, *Blume.*—For description, &c. see Pl. clxiv.

BUCHANANIA. Roxb.

For Gen. Char. see letter press to Pl. clxv.

1. Buchanania latifolia, *Roxb.*—For description, &c. see Pl. clxv.

2. Buchanania angustifolia, *Roxb.*—A small or middling sized tree, young shoots pilose, leaves linear oblong to lanceolate or spathulate, obtuse emarginate or acute at the apex, sub-membranaceous glabrous on both sides, about 3-8 inches long by 1-2 broad, petioles 10 lines to 1½ inches long, panicles terminal and from the upper axils glabrous or pubescent from considerably shorter to a little longer than the leaves, flowers, &c. as in B. latifolia. *Roxb. Fl. Ind.* ii. 386. B. intermedia, *Wight Icones*, 81. Buchanania lanceolata, *Wight Icones.* 237.

A small or middling sized tree not uncommon in subalpine dry jungles throughout this Presidency and in Ceylon. I have specimens from S. Travancore, the Naggery hills, in Arcot, the Vellore hills, Cuddapah and Kurnool hills, and elsewhere, and I cannot separate them even as varieties ; the tree is known in Teligu under the names Sàrà or Chàrà, and also Peddà morali, the wood is used by the natives for various purposes.

SOLENOCARPUS. WA.

Gen. Char. Flowers hermathrodite, calyx small deciduous 5-toothed, lobes imbricate, petals 5 oval patent valvate, disk broad annular, stamens 10 inserted below the margin of the disk, filaments alternately shorter, ovary free sessile 1 celled, style thick clavate, stigma oblique truncated, ovule pendulous from one side near the apex of the cell, drupe small obliquely oblong truncate compressed, pericarp cellular replete with a fragrant oil, putamen bony, seed linear compressed, cotyledons linear plano-convex, radicle very short superior. A tree, leaves fascicled at the extremities of the old branches and alternate on the young ones, on longish petioles, unequally pinnate, leaflets 5-7 pairs elliptic oblong acuminate slightly crenulate glabrous, paler beneath, lateral nerves pellucid uniting into one that is parallel and close to the margins, panicles fascicled from the apex of the branches. *WA. Prod. p.* 171 ;—*Benth. and Hook. Gen. Pl.* 1. *p.* 422.

1. Solenocarpus Indica, *WA.*—Character that of the genus.

A tree discovered by Dr. Wight at Courtallum. I have never had the good fortune to find it, but hope to be in a position to figure it before this work is brought to a close.

ODINA. Roxb.

For. Gen. Char. see letter press to Pl. cxxiii. (to Syn. add Harpephyllum, *Bernhardi.*)

Odina Wodier, *Roxb.*—For description, &c. see Pl. cxxiii.

SEMECARPUS. Linn. f.

For Gen. Char. see letter press to Pl. clxvi.

1 Semecarpus Anacardium, *Linn.*—For description, &c. see Pl. clxvi.

2. Semecarpus Grahami, *Wight.*—An immense tree, young parts rufo-villose, leaves spathulate very broad near the acute or rounded apex and gradually tapering down to the base, coriaceous when adult, membranaceous when young, glabrous or subglabrous above except the costa and margin which are furnished with long hairs but sometimes there are a few long hairs scattered over the veins and lamina, always hairy beneath, 1-2 feet long 4½-6 inches broad a little below the apex, but scarcely ½ that breadth at the centre of the leaf, petioles 3-6 lines long furnished with 2 subulate stipels, panicles rufo-tomentose racemose towards the summit of the branches, fruit with the hypocarp 1¼-1½ inches long. *Wight Icones* 235, (in young fruit.)

A gigantic deciduous tree, not uncommon in the Western ghat forests of this Presidency from Canara down to Cape Comorin, and also on the Bombay ghats, it is particularly abundant on the Carcoor ghat and about the foot of the Nilgiris below Makurty and in the dense moist woods on the Anamallays at 2000-3000 feet elevation, the young saplings are beautiful objects from their splendid foliage, but the larger trees have a straggling habit about the top; the tree flowers in December and January and ripens its fruit in April and May; a black oily acrid substance exudes from the fruit as in S. Anacardium, and it has the same properties.

3. Semecarpus subpeltata, *Thw.*—A large tree 30-40 feet, leaves ovato-lanceolate acuminate, glabrous coriaceous shining subpeltate, 10-15 inches long 4-6½ broad, petiole thick 1½-2 inches long, panicles terminal on the branches large with patent branches, drupe transversely oblong, slightly compressed, the lower half covered by the subreniform large fleshy hypocarp, about 3-4 inch long 1-¼ broad. *Thw. En. Pl. Zey. p.* 75.

Ceylon moist forests between Galle and Ratnapoora, called Maha badúlla.

4. Semecarpus Gardneri, *Thw.*—A middling sized tree, leaves lanceolate or oblongo-lanceolate, acuminate glabrous 4½-13 inches long by 1½-4 inches broad, petiole rather thick ¾-2 inches long, panicles terminal about the length of the leaves, drupe obliquely oblong rather compressed, 9 lines long, covered in its lower half with the large fleshy hypocarp. *Thw. En. Pl. Zey. p.* 76.

Ceylon, central provinces up to 3000 feet elevation, called Badúlá.

5. Semecarpus obscura, *Thw.*—A middling sized tree, leaves glabrous ovato-oblong obtuse cuneate at the base shining above, 3-4 inches long by 1½-1¾ broad, petiole about 3 lines long scarcely thickened, panicles terminal about as long as the leaves, drupe oblong half covered with the hypocarp. *Thw. En. Pl. Zey. p.* 76.

Ceylon, central provinces up to 3000 feet.

6. Semecarpus oblongifolia, *Thw.*—A middling sized tree, leaves glabrous oblong rounded at the apex or more or less acuminate cuneate at the base, 3½-12 inches long by 1-2½ inches broad, petioles 3-8 lines long thickened at the base, panicles terminal, drupe oblong rather oblique and compressed, apiculate ½ to 1 inch long, hypocarp narrow cup-like. *Thw. En. Pl. Zey. p.* 76;—and S. nigro-viridis and acuminata, *Thw. l. c. p.* 76 & 410.

Ceylon, plains up to 4000 feet elevation.

7. Semecarpus coriacea, *Thw.*—A middling sized tree, leaves glabrous obovate or obovato-oblong very coriaceous rounded at the apex or obscurely and obtusely acuminate, more or less narrowed at the base, costa thick and channelled, 3½-7 inches long, 1½-3½ broad, petiole stout 2-5 lines long, panicles terminal shorter than the leaves, rachis short the branches spiked, drupe obcordate oblique compressed mucronulate, 8 lines in length, 11 lines in breadth, hypocarp 4½ lines long. *Thw. En. Pl. Zey. p.* 77.

Ceylon, central provinces 5000-7000 feet.

8. Semecarpus parvifolia, *Thw.*—A middling sized tree, leaves glabrous ovato-oblong abruptly and obtusely acuminate or rounded at the apex, narrowed at the base, coriaceous 1½-3½ inches long, ¾-1½ broad, petiole 3-6 lines long sulcate above not thickened, panicles terminal, the branches racemiform few flowered, drupe elongato-conical, uncinato-acuminate rather oblique. *Thw. En. Pl. Zey. p.* 77.

Ceylon, in the Galle district, called Heendabùlà.

9. Semecarpus Moonii, *Thw.*—A middling sized tree, leaves glabrous coriaceous lanceolate, shortly acuminate narrowed at the base, 6-12 inches long by 2-5 inches broad, petioles 1-3 lines long, panicles terminal elongate many flowered, drupe oblique oblong compressed apiculate. *Thw. En. Pl. Zey. p.* 77.

Ceylon, south of the Island at no great elevation.

10. Semecarpus obovata, *Moon.*—A middling sized tree, leaves glabrous, shining above obovate rounded at the apex or abruptly and obtusely acuminate, rounded or subcordate at the narrowed base, 3-7 inches long by 1¾-5 inches broad, petioles 1-2 lines long thickened, panicles terminal longer than the leaves, drupe (immature), hypocarp narrow elongate. *Moon. Cat. p.* 22;—*Thw. En. Pl. Zey. p.* 77.

Ceylon, Ratnapoora and Caltara.

11. Semecarpus pubescens, *Thw.*—A small tree, branches elongate terete pubescent, leaves lanceolate acuminate subrotund at the base, glabrous above except the costa pubescent beneath, 5-13 inches long by 1½-3 inches broad, petiole ½-1 inch long thickened pubescent, panicles terminal elongate, drupe oblong slightly oblique about 6 lines long 3 lines broad supported on a short cup-like fleshy hypocarp. *Thw. En. Pl. Zey. p.* 77.

Ceylon, Ratnapoora district at no great elevation.

12. Semecarpus marginata, *Thw.*—An erect shrub, 6-8 feet sparingly branched, leaves glabrous on both sides or hirsute beneath lanceolate acuminate, narrowed and cordate at the base furnished with a conspicuous membranaceous margin, 6-14 inches long by 2½-5 inches broad, petiole much thickened ¼-1½ inches long, panicles cauline puberulous, drupe ovoid oblique rather compressed about 4 lines long reddish seated on the cup-shaped scarlet hypocarp. *Thw. En. Pl. Zey. p.* 77.

Ceylon, in the forests at Galle, Ratnapoora and Ambagamwa.

13. SEMECARPUS TRAVANCORIA, *Bedd.*—A fine tree only discovered whilst this number is passing through the Press ; will shortly be figured.

HOLIGARNA. HAM.

For Gen. Char. see letter press to Pl. clxvii.

1. HOLIGARNA LONGIFOLIA, *Roxb.*—For description, &c. see Pl. clxvii.

CAMPNOSPERMA. THW.

For Gen. Char. see letter press to Pl. clxviii.

1. CAMPNOSPERMA ZEYLANICUM, *Thw.*—For description, &c. see Pl. clxviii.

SPONDIAS. LINN.

For Gen. Char. see letter press to Pl. clxix.

1. SPONDIAS MANGIFERA, *Pers.*—For description, &c. see Pl. clxix.

2. SPONDIAS DULCIS, *Forst.*—Has been introduced from the Society Islands into a few gardens in India and Ceylon, it yields a very pleasant fruit.

ORDER XXXIII.—CONNARACEÆ.

Flowers usually hermaphrodite regular or nearly so. Calyx quinquepartite persistent valvate or imbricated. Petals 5, ligulate and longer than the calyx or rotundate cuneate and shorter, usually imbricated, free or slightly coherent. Stamens perigynous or hypogynous, 5 or more, usually 10 the alternate ones in that case (those opposite the petals) considerably shorter than the others and frequently imperfect ; filaments filiform often monadelphous at the base ; anthers short didymous, the dehiscence introrse, sometimes turned round at length. Disk 0 or thin surrounded by the base of the stamens. Carpels usually 5 rarely 1-3, free, hairy, 1-celled. Style subulate or filiform, stigma subcapitate, simple or 2-lobed. Ovules 2, collateral, ascending from the base of the inner angle of the cell, orthotropous. Capsule usually solitary, sessile or stipitate, follicular dehiscing usually in front, rarely on the back, 1 or very rarely 2-seeded. Seeds erect, with or without an arillus or with the testa arilliform below the middle. Embryo either exalbuminous with amygdaloid cotyledons or albuminous with foliaceous cotyledons, the radicle superior or very rarely ventral. Trees or climbing or erect shrubs. Leaves persistent or deciduous, alternate, exstipulate, simple or imparipinnate, with 1 or many pairs of leaflets, leaflets subcoriaceous or coriaceous, always entire. Flowers small and inconspicuous, racemose or paniculate. Capsule glabrous or naked internally.

CONNAREÆ.

Sepals imbricate, seed exalbuminous.						
Capsule sessile, the fruit-calyx dilated	..	...	...	...	..	ROUREA.
Capsule stalked, the fruit-calyx not dilated	...	...	...	..	..	CONNARUS.

CNESTIDEÆ.

Sepals valvate, seed albuminous.						
Calyx 5-parted erect, st. 5 fertile, 5 scale like and sterile, carpel 1			..	..		ELLIPANTHUS.

An order of no importance in a forest view. Ellipanthus yields a middling sized tree peculiar to Ceylon, Connarus 2 shrubs, 1 common to both the Peninsula and Ceylon, and the other only in the Peninsula, and Rourea 1 shrub found both in Ceylon and India.

ROUREA. AUBL.

Gen. Char. Calyx quinquepartite, the divisions larger in fruit and imbricated, clasping the base of the fruit. Petals 5 longer than the calyx, usually linear-oblong. Stamens 10, alternately longer and shorter, the filiform filaments united at the base, the anthers didymous. Carpels 5, four usually imperfect, the fifth attenuated into a straight subulate style, the stigma subcapitate. Capsule sessile, curved, clasped at the base by the calyx, chartaceous, 1-seeded. Seed erect ; the arillus erect, incomplete, slit in front, equalling or shorter than the seed ; testa shining, smooth ; albumen 0. Trees and shrubs.

1. ROUREA SANTALOIDES, *Vahl.*—Branches terete glabrous, (young buds slightly rufo-pubescent) leaves unequally pinnate, 3-8 inches long, leaflets 2-6 pair with an odd one generally opposite or subopposite rarely alternate ovate to narrow elliptical with a long blunt acumination, rather coriaceous glabrous on both sides shining above dull beneath, 1-3½ inches long by less than a ¼ to 1½ inches broad, veins and veinlets prominent, petiolules 2-3 lines long, panicles 4-5 aggregated in the axils and slightly united at the very base about 3 inches long, pedicels lax glabrous, 2-6 flowered below, 1 flowered above, minutely bracteolate at the base, flowers 3-3½ lines in expansion, calyx glabrous but ciliate round the edge, stamens alternately shorter, the longer ones about the length of the petals, ovaries glabrous, capsule solitary 7-8 lines long narrowed upwards glabrous rather fleshy, curved.—Connarus santaloides, *Vahl. Symb.* 111. 87. Rourea santaloides, *W A. Prod.* 144.

A shrub (sometimes sub-scandent) common about Mercara and throughout Coorg, in South Canara, Ceylon, and on the Bombay ghats, it is also found in tropical Africa. My Ceylon specimens differ from the Peninsula ones in having fewer and more

ovate leaflets, in the flowers being rather smaller, and in the glomerate base of the panicles and often the base of the pedicels being pubescent and in the calyx being quite hairy round the margin instead of only minutely ciliate.

Analysis of Genera, Pl. XI, fig. 4.

1. A bud showing the imbricate sepals and petals.
2. A flower.
3. The same petals removed, showing the 10 stamens, 5 long and 5 short, all joined in a tube at the base, and the 5 styles.
4. The same, petals and staminal tube removed, showing the 5 ovaries and styles.
5. A petal.
6. An ovary and style.
7. An anther, front and back view.
8. Fertile ovary cut vertically.

CONNARUS. Linn.

Gen. Char. Calyx quinquepartite, the imbricated divisions not accrescent, clasping the stalk of the capsule. Petals 5, sometimes slightly cohering. Stamens 10, the alternate ones shorter and sometimes abortive, the filiform filaments united at the base, the anthers didymous. Disk 0, or thin annular surrounding the outside of the base of the filaments. Carpels 5, four usually small or deficient, the fifth narrowed into a subulate style, the stigma subcapitate. Capsule obliquely oblong or obovate, subcompressed stipitate, coriaceous, dehiscing by the ventral suture, 1-seeded. Seed erect, with a lobed incomplete arillus adnate to the lateral hilum ; testa polished ; albumen 0. Trees or shrubs, often subscandent.

1. Connarus pinnatus, *Linn.*—A good sized shrub, the very young parts, young leaves and panicles rufo-pubescent, leaves 3-5 foliate, 3-6 inches long, leaflets opposite or sub-opposite at length glabrous on both sides and shining, oval oblong with a blunt point or acumination, 2-4 inches long by 1-1½ broad, petiolules 2-3 lines long, panicles terminal and from the upper axils often elongate, calyx very and petals slightly pubescent on the outside, ovary pubescent, capsule stalked at length quite glabrous, seed attached to the suture a little above the base with an imperfect arillus. *Lam. in Encycl. Meth.* 2 *p.* 95.

A very common shrub in the plains on the western side of the Madras Presidency. I have an allied species (imperfect specimens) from the Vizagapatam district which will perhaps prove distinct, it has very much larger leaves, and leaflets never shining and scarcely glabrous in age, and the older branches and petiolules pubescent.

Analysis of Genera, Pl. XI. Fig. 5.

1. A bud showing the imbricate sepals and petals.
2. A full flower.
3. The same petals removed, showing the 10 stamens alternately shorter, all joined in a tube, and the solitary carpel.
4. The same st. tube opened out.
5. Anther, front and back view.
6. Ovary cut vertically showing position of the ovules.
7. The same cut transversely.
8. Capsule.
9. The same cut vertically.
10. Seed and aril.

2. Connarus monocarpus, *Linn.*—An erect shrub, leaves 3-5 foliate, leaflets ovate to oval-oblong obtusely acuminate coriaceous glabrous shining above, panicles fascicled axillary and terminal, branches and calyx glabrous, flowers small yellowish white, sepals oblong, capsule sessile bright red when ripe, seed attached to the base of the cell with a complete fleshy arillus. *Linn. DC. Prod.* 2-85.

Not uncommon on the western side of the Madras and Bombay Presidencies and in Ceylon.

Connarus Championii (Thw.) is a scandent species peculiar to Ceylon.

ELLIPANTHUS. Hook. fil.

For Gen. Char. see letter press to Pl. clxx.

1. Ellipanthus unifoliatus, *Thw.*—For description, &c. see Pl. clxx.

ORDER XXXIV.—LEGUMINOSÆ.

Calyx of 5 or rarely fewer, usually united, sepals campanulate or tubular, more or less divided into 5 or fewer teeth or lobes, or rarely the sepals entirely distinct. Corolla of 5 or rarely fewer petals, perigynous or rarely hypogynous, very irregular in the first suborder, less so in the second, small regular and the petals often united in the third. Stamens twice the number of petals, rarely fewer or sometimes indefinite, inserted with the petals. Ovary single (consisting of a single carpel), with 1, 2, or more ovules arranged along the inner or upper angle of the cavity; style simple. Fruit a pod, usually flattish and opening round the margin in 2 valves, but sometimes follicular or indehiscent, or variously shaped. Seeds with 2 large cotyledons, a short radicle, and, with few exceptions, little or no albumen. Herbs, shrubs, trees or climbers. Leaves alternate or rarely opposite, usually furnished with stipules, compound or reduced to a single leaflet or to a dilated petiole, or in a few cases really simple, the leaflets or leaves entire or rarely toothed or lobed. Flowers in axillary or terminal racemes spikes or clusters, when terminal often becoming leaf-opposed by the growth of a lateral shoot, rarely solitary and axillary.

This is the largest order of phænogamous plants next to Compositæ, and it is widely distributed over the whole of the world. In Southern India it is abundantly represented by small herbaceous plants and creepers not coming within the scope of this work, but the valuable trees which it yields renders it about the most important order in a forest view.

All the species are known by their fruit being a legume or pod but the flowers of the 3 different suborders differ considerably, in the first Suborder Papilionaceæ, the flowers are very irregular and always in shape and appearance like that of the common pea, the upper petal or standard being always outside in the bud and all the petals imbricate; in the 2nd Suborder Cæsalpiniæ, the flowers are more regular and open in shape, the petals imbricate in the bud, like the common Cassia. In the 3rd Mimoseæ, the flowers are small and regular, generally sessile in spikes or heads, very rarely shortly pedicellate, the petals valvate.

PAPILIONACEÆ.—Though herbaceous plants of this suborder are very abundant at the higher elevations on our mountains, none of the trees ascend much above 4000 feet. The *Dalbergia latifolia* (the black wood, or rose wood of India) is the most valuable tree, it is abundant throughout the Presidency from the plains up to a little above 4,000 feet, but the finer trees are only found in the subalpine forests at elevations from 1000 to 4000 feet, where they often attain a girth considerably over 20 feet; it grows both in the dry deciduous forests and in moist ever green sholas, but generally affects the former. Next in importance are the *Pterocarpus marsupium* (the Vengay), and the *Pterocarpus santalinus* (Red sanders), the former, one of our most valuable trees, is found everywhere throughout the Presidency, but chiefly in subalpine tracts, where it grows to be an immense tree; it ascends to about 4,000 feet; the latter is only a small tree, and is confined to the dry forests about Cuddapah, North Arcot, and the south part of the Kurnool district, it is most valuable both as a timber and as a dye-wood, and the roots and stumps have been selling in the European market at £8 the ton; the tree is most abundant in the small area it affects, but the destruction of saplings by cow-herds is incalculable. The *Ougeinia dalbergioides* and the *Ormosia Travancorica* are also very valuable timber trees, the former abundant in the northern part of the peninsula (the Godavery forests and Bombay presidency), but very rare to the south; the latter common in all our Western ghat forests up to 3,000 feet, from Canara down to Cape Comorin. The *Pericopsis* is a very valuable timber confined to Ceylon. The *Dalbergia sissoo* and *Pterocarpus Indicus* are also most valuable as timber trees, but are only met with in a planted state in this Presidency. Of less valuable trees this suborder yields the *Dalbergia paniculata* and *Dalbergia frondosa*, the 5 *Erythrinas*, valuable as a substitute for deal, the *Butea frondosa* and the *Pongamia glabra*, giving a total of 17 trees; of large shrubs or small trees it yields 13, viz., *Indigofera pulchella*, *Mundulea suberosa*, *Sesbania grandiflora* and *Ægyptiaca*, *Desmodium cephalotes* and *congestum*, *Calpurnia aurea*, and 6 species of *Sophora*.

CÆSALPINIEÆ.—This suborder gives us about 25 trees and 6 shrubs: of the former, *Hardwickia binata*, (the àchá), *Tamarindus Indica* (the tamarind), *Acrocarpus fraxinifolius*, and *Dialium ovoideum*, are most valuable timber trees; the first is found in dry forests about the Coimbatore district, Cuddapah, Mysore, North Arcot, Kurnool, &c.; it does not ascend the mountains to any elevation; the Acrocarpus is confined to our western jungles, but is found in them from Canara down to Cape Comorin; and the Dialium is peculiar to Ceylon. Of less important trees, there are 5 Bauhinias, 4 Cassias (very good timber), 1 Cynometra, 1 Crudia (Ceylon), 1 Saraca (the beautiful Asok, formerly called Jonesia), 2 Poincianas (1 introduced), 1 Parkinsonia (introduced, and 1 Cæsalpinia (the Sappan), a valuable dye wood common on the western coast. Of shrubs there are 5 Cassias and 1 Bauhinia; 2 of the shrubby Cassias ascend the mountains to the higher elevations, but all the rest of the species are tropical or subtropical, not ascending the mountains above 3000 or 4000 feet.

MIMOSEÆ.—This suborder gives us 24 trees and 4 shrubs, almost all good timber. Of trees there are 8 Acacias, 6 Albizzias, 5 Pithecolobiums, 2 Adenantheras, 1 Prosopis, 1 Dichrostachys, and 1 Xylia; of shrubs, 3 Acacias and 1 Pithecolobium. The Xylia, the Prosopis, and some of the Acacias and Albizzias rank amongst our best timbers. Almost all the species are generally distributed all over the Presidency. The Pithecolobium coriaceum and Anamallayanum, are confined to the higher elevations 4-7000 feet, and some of the Albizzias and Pithecolobium bigeminum ascend to 3-4000 feet, but all the other species are confined to the plains and lower subalpine forests. The Acacias are thorny trees with free stamens, the Albizzias unarmed trees with monadelphous stamens and straight thin legumes; the Pithecolobiums trees with monadelphous stamens and twisted legumes.

SUB-ORDER I, PAPILIONACEÆ.—Flowers 5 merous. Corol very irregular, pea-shaped, the petals imbricate, the upper one (standard) always outside in the bud. Stamens 10, very rarely 9 or 5.

Tribe I, Galegeæ.—Leaves pinnate (rarely reduced to 3 or 1 leaflets) stipellæ none or setaceous, upper stamen usually free at least at the base, the others united into a sheath, very rarely all united, filaments filiform, pod not articulate, 2-valved.

Anthers gland tipped	INDIGOFERA.
Anthers without glands, legume linear flatly compressed, valves thick	MUNDELIA.
Anthers without glands, legume long narrow and thick, the endocarp continuous with the transverse partition	SESBANIA,

Tribe II, Hedysareæ.—Pod separating into 1 seeded articles, or the whole pod 1 seeded and indehiscent.

A tree racemes fascicled from nodes on the branches ... ... OUGEINIA.
Shrubs or small trees, flowers in axillary umbels (or terminal in racemes or panicles) ... DESMODIUM.

Tribe III, Phaseoleæ.—Leaves pinnately 3 foliate or 1 foliate, rarely 5 or 7 foliate, generally with stipellæ, upper stamen usually free, at least at the base or all but the base, anthers uniform or nearly so, pod not articulate, 2 valved.

Thorny trees ... ... ERYTHRINA.
Unarmed ... ... BUTEA.

Tribe IV, Dalbergieæ.—Leaves pinnate with 3-5-or more leaflets, stipellæ none or small and subulate, stamens all united into a sheath or tube, or into 2 parcels of 5, very rarely the upper one free ; pod indehiscent,

Pod flat and thin oblong or linear .. .. DALBERGIA.
Pod suborbicular surrounded with a broad wing ... . PTEROCARPUS.
Pod flattened but thick, with obtuse sutures ... ... PONGAMIA.

Tribe V, Sophoreæ.—Leaves pinnate with several leaflets without stipellæ, stamens all free or scarcely united at the base.

Pod moniliform terete, indehiscent or at length tardily 2 valved ... ... SOPHORA.
Pod shortly oblong, hard, woody, not winged, dehiscent, seed scarlet ... ... ORMOSIA.
Pod coriaceous indehiscent, the sutures with a margin or slight wing ... ... PERICOPSIS.

SUB ORDER II, CÆSALPINIEÆ.—Flowers usually 5 merous, petals often absent, when present nearly regular or irregular imbricate in the bud, with the upper petal inside, stamens 10 or fewer free or rarely some or all united.

Tribe VI, Eucæsalpinieæ.—Leaves all bipinnate except in Parkinsonia, calyx-segments free to the disk, petals 5 slightly unequal, anthers versatile, ovary or the stipe of the ovary free.

Leaves bipinnate.
Calyx tube short, segments imbricate, stamens 10 ... ... CÆSALPINIA.
Calyx tube campanulate, segments open, stamens 5 ... ... ACROCARPUS.
Calyx segments valvate, stamens 10 ... ... POINCIANA.
Leaves pinnate ... ... PARKINSONIA.

Tribe VII, Cassieæ.—Leaves unequally or abruptly pinnate, calyx-segments or sepals 5 free to the disk, petals 5 or none, anthers basifixed or rarely versatile, ovary or the stipe free.

Petals 5, stamens 5-10, leaves abruptly pinnate ... ... CASSIA.
Petals 0, stamens 2, leaves unequally pinnate ... ... DIALIUM.

Tribe VIII, Bauhinieæ.—Leaves simple entire 2 lobed, or rarely 2 foliate, calyx gamosepalous above the disk, or valvately parted, petals 5, anthers versatile, the stipe of the ovary free or adnate to the tube of the calyx. BAUHINIA.

Tribe IX, Amherstieæ.—Leaves abruptly or rarely unequally pinnate, 2 many (rarely only 1) foliate, calyx-segments free to the base imbricate or rarely valvate, petals 5 fewer or none, anthers versatile, the stipe of the ovary adhering to the tube of the calyx.

Petals 5 subequal or 3 subequal and 2 rudimentary or wanting, stamens free 10, all perfect or 5 minute and sterile, leaflets 1 many pair ... ... HUMBOLDTIA.
Petals 3 perfect, 2 rudimentary, stamens monadelphous 2-3 only perfect ... . TAMARINDUS.
Petals none, stamens 3-9, leaves abruptly pinnate ... ... SARACA.
Petals none, stamens 10, leaves equally pinnate ... ... CRUDIA.

Tribe X, Cynometreæ.—Leaves abruptly pinnate 2-many-foliate ; calyx segments free to the disk imbricate or valvate, petals 5 or fewer or none, anthers versatile.

Petals 0. ... ... HARDWICKIA.
Petals 5. ... ... CYNOMETRA.

SUB ORDER III, MIMOSEÆ.—Flowers small regular sessile in spikes or heads ; or rarely shortly pedicellate (Adenanthera and Prosopis), sepals and petals valvate and often united, stamens equal to or double the number of the petals or indefinite, radicle straight, leaves bipinnate.

Tribe XI, Adenantherеæ.—Stamens twice as many as the petals, free, anthers gland-tipped.

Flowers shortly pedicellate, legume compressed linear membranaceous with transverse partitions between the seeds, slightly tomentose ... ... ADENANTHERA.
Flowers sessile or very shortly pedicellate, legume continuous filled with pulp linear cylindrical slightly compressed torulose, at length crumbling to pieces ... ... PROSOPIS.
Flowers sessile, the lower ones neuter, legume contorted coriaceous indehiscent ... ... DICHROSTACHYS.
Legume large, broadly falcate, woody and 2 valved ... ... XYLIA.

Tribe XII, Acacieæ.—Stamens numerous free, usually short. ... ... ACACIA.

Tribe XIII, Ingeæ.—Stamens numerous united into a tube, usually long.

Pod straight thin ... ... ALBIZZIA.
Pod curved or spiral often thick and pulpy inside ... ... PITHECOLOBIUM.

SUB ORDER 1.—PAPILIONACEÆ.

Sepals united in a campanulate or tubular calyx, 5-toothed or cleft or 4-toothed by the complete union of the 2 upper sepals, or 2-lobed, the upper lobe or lip entire or 2-toothed, the lower entire or 3-toothed, rarely irregularly split. Corolla very irregular usually *papilionaceous*, that is of 5 petals, the upper one or *standard (vexillum)* outside in the bud, the 2 lateral ones or *wings (alœ)* intermediate, the 2 lowest ones more or less united along the lower edge or approximate, face to face, into a boat-shaped *keel (carnina)* more or less enclosing the stamens and style. Stamens usually 10, either all free or all united in a tube or sheath enclosing the style, closed or open along the upper edge, or the upper stamen more or less free from the others, the filaments all free for some distance under the anthers. Ovules usually amphitropous, and the radicle of the embryo more or less curved over the edge of the cotyledons, rarely short and straight.

TRIBE—GALEGEÆ.

INDIGOFERA. Linn.

Gen. Char.: Calyx tube short broad and oblique, the teeth or lobes nearly equal or the lowest longest. Standard ovate or orbicular, sessile or narrowed into a short claw; keel erect, obtuse or acuminate, with a hollow protuberance or spur on each side. Upper stamen free from the base, the others united in a sheath open on the upper side; anthers uniform, tipped by the point of the connectivum resembling a small gland. Ovary sessile or nearly so, with several or rarely 1 or 2 ovules; style incurved at the top, with a terminal stigma. Pod oblong, linear or rarely globular, terete or rarely flattened, straight or incurved, 2 valved, divided transversely between the seeds by cellular tissue. Seeds globular, or truncate at each end, or flattened, not strophiolate. Herbs, undershrubs, shrubs or small trees, more or less clothed or sprinkled with adpressed hairs attached by the centre, sometimes mixed with loose hairs or tomentum. Leaves 1 foliate or pinnate with 3 or more leaflets, occasionally stipellate. Stipules small setaceous. Flowers usually red or purple, in axillary spikes or racemes. Bracts usually small and deciduous. Bracteoles none. Standard usually silky-pubescent outside.

This genus, which yields the Indigo of commerce, is represented by numerous herbs or undershrubs, but the following is the only species in Southern India which attains the size of a small tree or large shrub.

1. Indigofera pulchella, *Roxb.*—A large erect shrub or small tree, young parts usually whitish with short adpressed hairs; branches angled, leaves pinnated; leaflets 8-10 pairs obovate or broad elliptic, emarginate, mucronate; racemes about the length of the leaves, sessile many flowered, springing from the axils of the leaves and from the former years' leafless branches; flowers large at first crowded, afterwards more distant: calyx-segments short and acute; petals many times longer than the calyx, patulous and resembling a bilabiate corolla, legumes scattered along the rachis, slightly deflexed, nearly cylindrical, thick, straight, sharp pointed, 10-12 seeded, sutures callous, thick. *Roxb. Fl. Ind.* iii. *p.* 382;—*WA. Prod. p.* 203. Indigofera purpurescens, *Roxb. Fl. Ind.* iii. *p.* 383.

A large, showy, flowering shrub, or often a small tree, very common on the Nilgiris, Pulneys, Anamallays, and other hills in this Presidency, up to considerable elevations, also found on the hills on the eastern coast.

Indigofera arborea, *Roxb.*, atropurpurea, *Roxb.*, and violacea, *Roxb.*, also grow to large shrubs or small trees in Bengal, but are not found except in gardens in this Presidency,

Analysis of Genera, Pl. XII, fig. 1.

1. A leaf (life size).
2. Portion of a raceme (life size).
3. A flower.
4 & 5. The same opened out to show the different parts.
6. Anthers, front and back view.
7. Ovary cut lengthways.
8. The ripe legume (life size).

MUNDULEA. DC.

Gen. Char.: Calyx campanulate shortly 5 toothed, the 2 upper teeth subconnate, vexillum ample spreading, with transverse callosities above the short claw, alæ falcato-oblong slightly cohering with the keel, keel obtuse incurved at the apex, stamens diadelphous, the upper one free at the base, connate with the others at the middle, filaments slightly dilated at the apex, anthers uniform, ovary many ovuled, style incurved glabrous subterete, stigma capitate, legume linear flatly compressed, valves very thick tardily dehiscing, seed reniform estrophiolate. Shrubs or small trees, silky-pubescent, leaves unequally pinnate, leaflets entire reticulately penniveined, stipules small, racemes terminal, flowers showy rose or white.

1. Mundulea suberosa, *Roxb.*—A small tree with a very corky cracked bark, trunk erect soon branching out into a ramous head, ends of the branches and young shoots tomentose, leaves unequally pinnate 6-9 inches long, leaflets 6 9 pair opposite, subopposite or alternate elliptic oblong, often gradually narrowed towards the apex obtuse and sometimes mucronulate, subglabrous above, silky beneath, 1-2 inches long by $\frac{1}{4}$ inch broad, racemes terminal, flowers large rose or white, in pairs long pedicelled; legume irregularly contracted between the seeds, about 4 inches long.—Robinea suberosa, *Roxb. Fl. Ind.* iii. 327. Tephrosia suberosa, *WA. Prod. p.* 210. Mundulea suberosa, *Benth.*

This small tree is very ornamental when in flower, as it is perfectly covered with blossoms; one variety has rose flowers and another white; it is common about subalpine jungles on both sides of the Presidency, and particularly abundant in Tinnevelly.

Analysis of Genera, Pl. XII, fig. 2.

1. Portion of a leaf (life size).
2. A flower (life size).
3. The same opened.
4. Vexillum, showing the callosities.
5. The free vexillum stamen.
6. Ovary cut open.
7. Legume (life size).

SESBANIA. Pers.

Gen. Char. : Calyx-tube broad, truncate, or with nearly equal teeth or lobes. Standard orbicular or ovate, spreading or reflexed ; keel incurved, obtuse or acuminate, the claws much longer than those of the other petals. Upper stamen free, geniculate near the base, the others united in a sheath angled near the base, anthers uniform or nearly so. Ovary with several ovules ; style glabrous, with a small terminal stigma. Pod long and linear (or oblong), 2-valved or indehiscent, the endocarp continuous with spurious transverse partitions separating the seeds. Seeds without any strophiole. Trees, shrubs or herbs, but of very few years' duration. Leaves abruptly pinnate, with numerous entire leaflets, the stipellæ minute or none. Stipules setaceous, usually very deciduous. Flowers yellow, red, variegated or white, in short loose axillary racemes ; pedicels slender. Bracts and bracteoles very rarely persistent to the time of flowering.—Agati, *Desv.*

1. Sesbania grandiflora, *Desv.*—A small tree, 20-30 feet high, but of only a few years' duration, glabrous and more or less glaucous, leaflets 10-30 pairs oblong or elliptical obtuse and often mucronate 1-1½ inches long, racemes short, flowers 2-4 very large white or red, calyx-tube ¾ inch long without the turbinate base, the teeth short and broad, petals 2-3 inches long, standard ovate rather shorter than the others, keel much incurved ending in an obtuse beak, pod upwards of a foot long about 3 lines broad.—Æschynomene grandiflora, *Roxb. Fl. Ind. vol.* iii. *p.* 330. Agati grandiflora, *Desv.* Coronilla grandiflora, *Willd.* iii. 1145. Agati, *Rheede Mal.* 1. *t.* 51.

A small tree 20-30 feet, common in the vicinity of villages and in gardens all over India and also in Australia, I have never met with it truly wild. The wood is useless except for fuel, the leaves and tender pods are eaten in curries by the natives, and cattle are very fond of them ; the tree is called Agati in Tamil and Avesi in Teligu ; it is in flower and fruit at all seasons.

2. Sesbania Ægyptiaca, *Pers.*—A small tree of only a few years duration, glabrous and somewhat glaucous, the branches terete or obscurely angled, leaflets 10-20 pairs, oblong obtuse 4-12 lines long, flowers in loose pendulous racemes shorter than the leaves, bracts and bracteoles very deciduous. Calyx about 3 lines long without the narrow turbinate almost stalk-like base, the teeth very short and broad, standard about ¾ inch broad, keel much incurved broad obtuse with an acute angle at the base, pod 8-10 inches long, 2-2½ lines broad. *Pers.* ;—*DC. Prod.* ii. 264. Æschynomene sesban, *Roxb. Fl. Ind.* iii. *p.* 332.

A beautiful little tree common in the vicinity of villages and cultivated land, the flowers are generally purple with yellow spots, but one variety has yellow flowers, and another red. The wood is said to make the best charcoal for gun-powder.

Analysis of Genera, Pl. XII, fig. 3.

1. Portion of a leaf (life size).
2. A flower.
3. The same open, showing the 9 monadelphous stamens and 1 free stamen.
4. Vexillum, showing the callosities.
5. Anthers, front and back view.
6. Ovary cut open.
7. Legume (life size.)

TRIBE—HEDYSAREÆ.

OUGEINIA. Benth.

For Gen. Char. see letter press to Pl. xxxvi.

1. Ougeinia dalbergioides, *Benth.*—For description, &c. see Pl. xxxvi. I have lately detected this tree on the Nilgiri mountains.

DESMODIUM. Desv.

Gen. Char. Calyx-tube short, the 2 upper lobes more or less united. Standard from oblong to orbicular, narrowed at the base ; wings oblong, usually adhering in the middle to the keel ; keel obtuse. Upper stamen free or more or less united with the others in a sheath or tube, anthers uniform. Ovary sessile or stipitate with 2 or more ovules, style incurved, subulate. Pod longer than the calyx, flat, one or both sutures indented between the seeds, separating into indehiscent 1 seeded articles, or rarely the articles opening on the lower edge in 2 valves, and then not always readily separating Herbs, shrubs, or rarely small trees. Leaves pinnately 3 foliolate or 1 foliolate, with stipellæ. Stipules usually dry, striate, membranous. Flowers purple, blue, pink or white, usually small, in terminal racemes or panicles, or rarely in axillary umbels or clusters.—Dendrolobium, *WA.* Dicerma, *DC.* Nicolsonia, *DC.* Phyllodium, *Desv.* Pteroloma, *Desv.* Catenaria, *Benth. Fl. Aust.* ii. *p.* 229.

1. DESMODIUM CEPHALOTES, *Wall.*—A shrub or small tree, old branches glabrous, young shoots obtusely triangular clothed with whitish pubescence, leaves trifoliate, leaflets oblong lanceolate nearly glabrous except the white pubescent parallel nerves beneath, stipules lanceolate acuminate, peduncles axillary solitary several times shorter than the petioles, flowers numerous white somewhat umbelled calyx segments broad about equal, legumes compressed 2-6 jointed. *WA. Prod. p.* 224. Hedysarum umbellatum, *Roxb. Fl. Ind.* iii. *p.* 360. *et H.* cephalotes, *l. c.* D. congestum, *WA. l. c.*

This shrub forms the chief undergrowth in some of our Teak forests; it is very abundant on the Anamallays and other subalpine forests on the west side of the Presidency, and is also found on the eastern mountains and occurs in Ceylon; it frequently grows to be a small tree, with a trunk about 10 inches in diameter.

Analysis of Genera, Pl. XII, fig. 4.

1. A head of flowers and a leaf (life size.)
2. A flower.
3. Legumes (life size.)
4. Section of a legume (copied from Wight's Icones.)

2. DESMODIUM UMBELLATUM, *DC.*—A bushy shrub, occasionally growing into a small tree, the young shoots silky. Leaflets 3 ovate or oval-oblong, obtuse or rarely almost acute, mostly $1\frac{1}{2}$-2 inches long, glabrous or nearly so above, pale or silky pubescent underneath, with prominent primary veins. Stipules very deciduous. Flowers white, in dense axillary umbels on a common peduncle, rarely attaining $\frac{1}{2}$ inch. Bracts very deciduous. Pedicels as long as the calyx. Bracteoles persistent, as along as the calyx-tube. Calyx silky, about 2 lines long, the lobes acute, not longer than the tube. Standard broad, twice as long as the calyx; wings much shorter; keel as long as the standard, without lateral protuberances. Pod of 3 or 4 thickish almost fleshy articles, each 3 or 4 lines long and not so much in breadth, not reticulate, indehiscent. *Benth. Fl. Aust.* ii. *p.* 230;—*WA. Prod. p.* 224.

This small tree or shrub is met with in similar localities as the last, and also occurs in Ceylon and Queensland.

TRIBE—PHASEOLEÆ.

ERYTHRINA. LINN.

For Gen. Char. see letter press to Pl. clxxv.

1. ERYTHRINA STRICTA, *Roxb.*—For description, &c. see Pl. clxxv.

2. ERYTHRINA INDICA, *Lam.*—A pretty large deciduous tree, trunk pretty straight short but thick, branches many forming a shady head, the younger ones armed with small black sharp prickles which generally fall off about the 3rd or 4th year, leaving the trunk and large branches unarmed, stipules falcate, petioles and leaves unarmed, leaflets glabrous entire, the terminal one broadly cordate, racemes terminal horizontal, calyx spathaceous contracted and 5-toothed at the apex, vexillum about 3 times shorter than the calyx, and about 4 times longer than the alæ, keel about the length of the alæ its petals distinct, stamens monadelphous with the sheath entire at the base, thence diadelphous with the tube split, ovary 10-15-ovuled, legume 6-12 inches long cuspidate very protuberant at the seeds and on each margin, when ripe blackish, seeds 6-8 oblong smooth blackish purple. *Roxb. Fl. Ind.* iii. *p.* 249;—*WA. Prod. p.* 260.

This tree is common throughout India, particularly about native villages, and it is much employed to support the pepper vine. It grows most readily from large cuttings, it flowers at the commencement of the hot season, and is then very showy as the flowers are large bright scarlet and produced in great quantity, the timber is light and soft and known (with the other species) as mootchee wood and much employed for toys, scabbards, light boxes, packing cases, &c. The plant is often used as a hedge, it is called Murukà in Tamil and Modugu in Teligu, it also grows in Ceylon and Australia, in the former island it is called Errabadu, and is used medicinally for men and cattle, and the young tender leaves are eaten in curries.

3. ERYTHRINA SUBEROSA, *Roxb.*—A small or middling sized tree with a corky deeply cracked bark, branches almost unarmed except at the insertion of the petioles, stipules lanceolate, petioles pubescent prickly, leaves unarmed, leaflets tomentose on the under side, terminal one rhomboid and acuminated sometimes reniform and rounded, racemes axillary or sometimes terminal spreading, calyx tubular 2 lipped, vexillum 5-6 times longer than the calyx and more than twice the length of the keel, keel cordate many times longer than the very minute alæ its petals united, stamens monadelphous, legume 2-3 seeded. *Roxb. Fl. Ind.* iii. *p.* 253;—*WA. Prod. p.* 260.

This tree is not uncommon in dry subalpine jungles throughout the Presidency, Northern Circars, Mysore, &c., it is known by the same native names as E. Indica and the wood is very similar.

4. ERYTHRINA SUBLOBATA, *Roxb.*—A large tree, trunk erect often of great size, branches spreading very numerous, the larger as well as the trunk without prickles and covered with thick bark, the inner stratum of which is fibrous, the middle yellow and farinaceous, the exterior smooth hard and yellow, prickles strong conical very sharp exceedingly numerous on the younger branches covering them almost entirely, leaves 12-18 inches long unarmed, leaflets the pair obliquely cordate the terminal one rhombic all variously lobate-sinuate or notched, in age smooth above, beneath covered with soft white down 5-6 inches each way, petioles long, terete pubescent without prickles, racemes terminal erect slender, calyx tubular 2 lipped, vexillum 5-6 times longer than the calyx 2-3

times longer than the keel, keel cordate several times longer than the minute alæ, its petals united, stamens monadelphous, legume 2-3 seeded. *Roxb. Fl. Ind.* iii. *p.* 255 ;—*WA. Prod. p.* 261.

This tree is found in the subalpine jungles on the eastern coast of this Presidency and on the North Arcot and Cuddapah hills, &c., its wood is similar to the other species, and it has similar native names.

5. ERYTHRINA OVALIFOLIA, *Roxb.*—A good sized tree, trunk straight, bark very thick and deeply cracked, branches numerous armed with innumerable small sharp black pointed prickles, leaflets oval entire, above pale green and covered with a few scattered depressed hairs, beneath very hoary, 4-6 inches long by 2-3 broad, petioles armed with a few prickles and furnished with 2 umbilicate glands at the insertion of the pair of leaflets and 2 similar ones at its apex, stipules small hard, racemes simple terminal horizontal from 1 to 6, flowers numerous dark red in threes round the raceme on downy erect pedicels, bractes of the pedicels four fold, viz., one below the insertion of each lateral pedicel and two to the central one, small downy, those of the calyx 2 small opposite ; calyx bursting open irregularly downy on the outside, vexillum twice the length of the keel erect, broad cordate emarginate, claw long and tapering, alæ a third shorter than the keel with the extremities colored, filaments diadelphous 9 and 1. *Roxb. Fl. Ind.* iii. *p.* 254;—*Wight Icones* 247.

This tree is found in Ceylon and Bengal. I have never observed it in this Presidency, but it probably occurs.

BUTEA. ROXB.

For Gen. Char. see letter press to Pl. clxxvi.

1. BUTEA FRONDOSA, *Roxb.*—For description, &c. see Pl. clxxvi.

Butea superba is a very large creeper common on the mountains of the eastern coast.

TRIBE—DALBERGIEÆ.

DALBERGIA. LINN.

For Gen. Char. see letter press to Pl. xxiv.

1. DALBERGIA LATIFOLIA, *Roxb.*—For description, &c. see Pl. xxiv.

2. DALBERGIA SISSOO, *Roxb.*—For description, &c. see Pl. xxv.

3. DALBERGIA PANICULATA, *Roxb.*—A large tree, trunk erect, bark smooth light ash-colored, branches numerous spreading, leaves 4-5 inches long, leaflets 5-6 pair oblong to obovate-oblong emarginate glabrous 1-1½ inches long by about 1 broad, stipules lanceolate falcate, panicles terminal leafy large, flowers numerous small whitish with a tinge of blue, calyx of a deep blackish purple hairy 5 cleft the lowest segment the longest and narrowest, alæ as long as the vexillum, which latter has no callosities, keel half the length of the alæ the 2 petals only slightly united for a little way at the middle, stamens diadelphous 5-5, ovary glabrous, legume lanceolate 1-2 seeded. *Roxb. Fl. Ind.* iii. 227.

This tree is common in the plains and subalpine dry forests throughout the Presidency ; its wood is white and not of much value, though in use with the natives for building and common purposes, it is very liable to the attack of insects. The tree is known in the Godavery forests by the Teligu name Porilla sopara, and in the Circars it is called Tello patsaru ; a cubic foot of the wood unseasoned weighs about 60 lbs., and 48 lbs. when seasoned ; its specific gravity is 768.

4. DALBERGIA FRONDOSA, *Roxb.*—A good sized tree, trunk erect, bark smooth and light ash-colored, leaflets about 5 pairs oval emarginate silky when young subglabrous in age, 1-1½ inches long by 1 broad, deciduous in the cold season and appearing with the flowers in April or May, stipules lanceolate falcate caducous, panicles pubescent axillary solitary shorter than the leaves composed of a few alternate ascending simple secund branches, flowers pale blue small, bractes small lanceolate villous early caducous, the largest below each pedicel the 2 pressing the calyx laterally, calyx hoary the 2 upper segments obtuse, lower ones more acute, lowest the narrowest and longest, vexillum with a large callosity at the base of the limb, alæ as long as the vexillum and twice as long as the keel, stamens equally diadelphous 5-5, ovary very slightly pubescent, legume lanceolate 1-4 (usually 2) seeded. *Roxb. Fl. Ind.* iii. 226 ;—*WA. Prod. p.* 266.

This tree is common in many of our subalpine forests and in Ceylon. I do not know whether it is the D. lanceolaria of Linn, but Mr. Dalzell refers it to that species ; it yields a useful timber, which is good for building purposes ; in the Godavery forests it is called Pedda sopara (Teligu), and in the Circars Yerra patsaru (Teligu), on the Bombay ghats it is called Dandous ; the bark, and an oil obtained from the seeds are in use medicinally with the natives.

PTEROCARPUS. LINN.

For Gen. Char. see letter press to Pl. xxi.

1. PTEROCARPUS MARSUPIUM, *Roxb.*—For description, &c. see Pl. xxi.

2. PTEROCARPUS SANTALINUS, *Linn.*—For description, &c. see Pl. xxii.

3. PTEROCARPUS INDICUS, *Willd.*—For description, &c. see Pl. xxiii.

PONGAMIA. Vent.

For Gen. Char. see letter press to Pl. clxxvii.

1. Pongamia glabra, *Vent.*—For description, &c. see Pl. clxxvii.

TRIBE—SOPHOREÆ.

CALPURNIA. E. Mey.

Gen. Char. Calyx teeth short broad, 2 upper ones subconnate, vexillum suborbicular erect or sub-recurved ; alæ falcato oblong ; keel incurved obtuse, its petals cohering at the back, stamens free, or 9 very shortly united at the base, anthers versatile generally small, ovary stipitate many ovuled, style incurved subulate, stigma small terminal, legume linear flatly compressed membranaceous indehiscent, the upper suture with a slight wing, seed compressed oval-oblong transverse, radicle inflexed. Shrubs or trees, leaves unequally pinnate, leaflets numerous without stipels ; stipules small inconspicuous, flowers yellow in axillary racemes or in panicles at the apex of the branches, bractes small, bracteoles none.

1. Calpurnia aurea, *Lam.*—A large shrub, young shoots slightly pubescent, leaflets about 9 or 10 pairs, oval obtuse nearly glabrous opposite or subopposite, stamens 9 very slightly joined at the base, the 10th quite free, ovary pubescent, legume at length glabrous. *Benth. and Hook. Gen. Pl.* ii. *p.* 554. Virgilea aurea, *Wight. Ill. tab.* 81 ;—*W.A. Prod. p.* 179. Robinea subdecandra, *L'herit.* R. Heynei, *Walt.* Podalyria aurea, *Willd.*

This showy shrub is common on the Denkinacottah hills (Salem) and in the subalpine jungles at Courtallum, &c.

Analysis of Genera, Pl. XII, fig. 5.

1. Portion of a leaf (life size.)
2. A flower opened, showing the calyx, one of the alæ, the keel, and the stamens (9 and 1.)
3. The vexillum.
4. The stamens.
5. Anthers, front and back view.
6. Ovary cut open.
7. The legume, showing the winged upper margin.

SOPHORA. Linn.

Gen. Char. Calyx teeth very short. Standard broad, erect or reflexed ; wings oblong, erect, free ; keel-petals like the wings or rather larger, overlapping each other at the back but scarcely united. Stamens 10, free, or 9 of them slightly connected in a ring at the base ; anthers uniform. Ovary shortly stipitate, with several ovules ; style incurved, with a minute terminal stigma. Pod moniliform, fleshy, coriaceous or woody, indehiscent or opening at length in 2 valves, each seed enclosed in a separate cell. Seeds globular, oblong or flattened ; cotyledons fleshy ; radicle very short and straight or more or less elongated and inflexed. Trees, shrubs or rarely under shrubs. Leaves unequally pinnate, without stipellæ or with very small setaceous ones. Stipules small. Flowers white, yellow or rarely violet-blue, in racemes either simple and terminal or forming large terminal panicles. Bracts small, deciduous ; bracteoles usually none. Edwardsia, *Salisb.* Styphnolobium, *Schott.* Broussonetia, *Orteg.*

1. Sophora heptaphylla, *Linn.*—A small tree or shrub, leaflets alternate 7-13 ovate oblong to elliptic acuminate glabrous above pubescent beneath, 3-4 inches long by 1-1¼ broad. Stipules subulate, racemes leaf-opposed lax about the length of the leaves, flowers numerous, bractes subulate, calyx pubescent campanulate suboblique slightly 5 toothed, ovary 3-4 ovuled, legume villous 2-4 seeded attenuated at the apex, much contracted between the seeds, seeds 2-4 oval bright shining red. *Wight Icones tab.* 1155.

This small tree is common on the northern and western slopes of the Nilgiris and in Ceylon, 4000-7000 feet, but I have not observed it elsewhere.

2. Sophora glauca, *Lesch.*—A large shrub, leaflets 19-23 elliptical mucronate upper side glaucous and velvetty, under villous, racemes terminal crowded. *DC. Prod.* ii. 95 ;—*Wight Icones tab.* 979.

A common shrub on our western mountains.

3. Sophora Madrasapatana, *Wight.*—A shrub, leaflets about 25 glabrous from elliptic to subovate obtuse mucronate or retuse at the apex, 6-8 lines long by about 3 lines broad, racemes axillary and terminal very slightly pubescent many flowered, legumes villous.—Edwardsia Madraspatana, *Wight Icones tab.* 1054.

North Arcot and Cuddapah hills.

4. Sophora tomentosa, *Linn.*— A small tree, leaflets 11-19, oval roundish very obtuse covered on both sides as well as the calyx with hoary tomentum, racemes terminal elongate. *Linn. Sp. p.* 533 ;— *W.A. Prod. p.* 179 ; —*Roxb. Fl. Ind. p.* 361.

This is indigenous on the sea coast in Ceylon (Galle), but I have only seen it in gardens in this Presidency ; in Ceylon it is called Moodoomoroonga, it is also found in Australia.

5. Sophora violacea, *Thw.*—A middling sized shrub, branches and petioles adpressedly pilose, stipules and bractes minute subulate caducous, leaflets 7-12 pairs with an odd one elliptic obtuse very shortly mucronate slightly pilose, paler beneath, 6-15 lines long, 3-7 lines broad, petiolules $\frac{1}{2}$-1 line long, racemes terminal many flowered adpressedly pilose about equalling the leaf, calyx tubular, margin 5 lobed, flowers violet, ovary about 7 ovuled, legumes slightly pilose much constricted, nodes ovoid, seed ovoid brown. *Thw. En. Pl. Zey. p.* 94.

Ceylon, in the Galle district, a very beautiful shrub.

6. Sophora interrupta, *Bedd.*—A large shrub, branches and petioles adpressedly pilose, stipules and bractes caducous villous, leaves 8-9 inches long, leaflets 9-14 pair with an odd one, oval very emarginate finely reticulated glabrous above slightly hairy beneath, 10-14 lines long by 6-9 lines broad, petiolules 2 lines long, racemes terminal, leaf-opposed shorter than the leaves, flowers few distant and large, on pedicels about 6 lines long, petals long clawed, ovary densely sericeous 3-7 ovuled, legume slightly pilose, often much interrupted and filiform between the nodes, each of which is completely 4 winged.

This beautiful shrub I have only observed on the Codoor hills, Cuddapah district.

Analysis of Genera, Pl. XI, fig. 6.

1. Portion of a leaf (life size).
2. The calyx.
3. The same open.
4. The vexillum.
5. One of the alæ.
6. The keel.
7. The stamens.
8 & 9. Anther, front and back view.
10. Ovary.
11. Legume (life size).

ORMOSIA. Jacks.

For Gen. Char. see letter press to Pl. xlv.

1. Ormosia Travancorica, *Bedd.*—For description, &c. see Pl. xlv.

PERICOPSIS. Thw.

For Gen. Char. see letter press to plate clxxxvii.

1. Pericopsis Mooniana, *Thw.*—For description, &c. see Plate clxxxvii.

SUB ORDER II.—CÆSALPINIEÆ.

Flowers usually 5-merous, very rarely 4-merous or 3-merous, the sepals united at the base into a short tube, lined by the disk, bearing at its margin the petals and stamens, rarely forming a campanulate or tubular calyx with the stamens near the base, as in *Papilionaceæ*, the free part of the sepals or lobes of the calyx, imbricate or rarely valvate. Corolla irregular or nearly regular, either with the petals variously imbricate in the bud, but the upper one never outside and usually quite inside, or some or all of the petals wanting. Stamens 10 or fewer, (or rarely indefinite) free or rarely more or less united, all perfect or several of them reduced to staminodia. Ovules anatropous or nearly so. Radicle of the embryo short and straight.

TRIBE—EUCÆSALPINIEÆ.

CÆSALPINIA. Linn.

Gen. Char. Sepals 5, shortly united at the base, much imbricated, the lowest one larger and concave. Petals 5, spreading, rather unequal, the upper inner one the smallest, the 2 lowest outer ones the largest. Stamens 10, free ; anthers uniform, ovate. Ovary with 2 or more ovules ; style subulate, with a small stigma. Pod flattened, obliquely ovate oblong or broadly linear-falcate, 2-valved. Seeds thick or flattened, with a very small hilum ; albumen none ; radicle short, straight. Shrubs, trees or woody climbers ; often armed with scattered recurved prickles. Leaves abruptly bipinnate. Flowers yellow, in racemes, either single in the upper axils or forming terminal panicles. Filaments more or less hairy at the base.

1. Cæsalpinia sapan, *Linn.*—A small tree armed, pinnæ 10-12 pair, leaflets 10-12 pairs unequal sided obliquely oval-oblong emarginate paler and minutely dotted on the under side, flowers in terminal panicles, calyx glabrous, legumes compressed woody very hard glabrous elliptic-obovate obliquely truncated, cuspidate at the apex 3-4 seeded. *Linn. Sp. p.* 544 ;—*WA. Prod. p.* 281.

This is a small thorny tree not exceeding 2 feet in girth and coming to maturity in 12-15 years, it yields a valuable dye wood, and fetches a good price as such on the western coast, it grows in various parts of this Presidency, but I have only seen it in any quantity on the western coast, where it is extensively planted. The Forest Department have now a small plantation of it at Nellumbur ; it is easily raised from seed, and can be transplanted without any failures. The wood yields a red dye, and sells at 1$\frac{1}{2}$-2 Rupees the cubic foot : the powder used at the Holee festival is extracted from it.

Analysis of Genera, Pl. XIII, fig. 1.

Cæsalpinia sepiaria (the Mysore thorn), C. bonducella, C. mimosoides, C. digyna, and C. paniculata, are thorny scandent hedge plants not coming within the scope of this Flora. C. pulcherrima, *Sw.* is a large ornamental shrub only found in cultivation.

ACROCARPUS. Wight.

For Gen. Char. see letter press to Pl. xliv.

1. Acrocarpus fraxinifolius, *Wight.*—For description, &c. see Pl. xliv.

POINCIANA. Linn.

For Gen. Char. see letter press to Pl. clxxviii.

1. Poinciana elata, *Linn.*—For description, &c. see Pl. clxxviii.

2. Poinciana regia, *Boj.*—This well known ornamental tree, an introduction from Madagascar, is now very common in Madras, and is much planted throughout the Presidency in avenues, gardens, parks, &c.

PARKINSONIA. Linn.

Gen. Char. Sepals 5, equal, recurved, shortly united at the base. Petals 5, ovate, flat, upper one roundish and long-clawed. Stamens 10, distinct, declinate, a little longer than the claw of the upper petal. Style filiform, somewhat ascending. Legume linear-oblong, acuminated at both ends torulose at the seeds and compressed between them. Seeds oblong, the testa tumid, hilum linear, cotyledons oblong, radicle ovate. A thorny tree or shrub; thorns solitary or in threes, straight. Leaves pinnated, or occasionally bipinnate, petiole linear, very long, winged, leaflets small, obovate-oblong, often deciduous or quite abortive. Racemes lax. Flowers yellow.

1. Parkinsonia aculeata, *Linn.*—A small weak tree or shrub about 12 feet in height, an introduction from South America, now quite run wild all over the Presidency about villages, Railway embankments, &c; its wood is used for fuel, and it yields a fibre valuable as a paper material.

Analysis of Genera, Pl. XIII, fig. 2.

TRIBE—CASSIEÆ.

CASSIA. Linn.

For Gen. Char. see letter press to Pl. clxxix.

1. Cassia florida, *Vahl.*—For description, &c. see Pl. clxxix.

2. Cassia Roxburghii, *DC.*—For description, &c. see Pl. clxxx.

3. Cassia fistula, *Linn.*—A small or middling sized tree with a smooth bark, leaflets 4-8 pairs broadly ovate usually obtuse or retuse, sometimes slightly acuminated glabrous, petioles without glands, stipules minute, racemes terminal long lax drooping, flowers long pedicelled, legumes cylindrical pendulous glabrous smooth. *WA. Prod. p.* 285. Fistula, *DC.* Cathartocarpus, *Pers.* Cassia fistula et rhombifolia. *Roxb. Fl. Ind.* ii. *p.* 333, 354.

This tree is most gorgeous when covered with its long pendulous racemes of brilliant yellow flowers, it is very common throughout the jungles of Southern India, Bengal, Bombay, Birmah and Ceylon, and is much planted in gardens at Madras and elsewhere in the Presidency; it is called Amaltas in Hindostanee, Reylu in Teligu, Kone and Sirikone in Tamil, Kaki in South Canara, Bawa and Gurmala in Bombay, and Ahalla in Ceylon. The bark is used by tanners, and the sweet pulp contained in the pod is said to be a cure in dysentery and is a safe purgative; the wood is strong, elastic and durable, close and straight grained, of a dark brown colour often beautifully mottled, and works well; a cubic foot unseasoned weighs 72-78 lbs., and when seasoned 61 lbs., and its specific gravity is ·976; it is used in ship building and for bows and axles, and is also suited for furniture; in Birmah the tree is called Gnoo-sh-woay.

4. Cassia glauca, *Lam.*—A middling sized tree, branches numerous spreading in every direction, young ones irregularly angled almost glabrous, leaflets 4-6 pair with an erect clavate gland between each of the 2-3 lower pair, oval broadest at or below the middle, the upper ones the largest, upper side glabrous under glaucous and slightly pubescent; stipules linear, subulate falcate, racemes axillary corymbiform long peduncled erect crowded near the ends of the branches about $\frac{1}{2}$ the length of the leaves, flowers large long pedicelled, the pedicels subtended by an ovate acuminated caducous bracteole, petals all nearly equal, anthers all fertile, equally long, the 2 lower on rather longer filaments than the others, legumes drooping linear straight thin glabrous, the margin a little tumid. *Lam. Ency. Meth.* i. *p.* 647;—*WA. Prod. p.* 289. C. arborescens. *Roxb. Fl. Ind.* ii. 345. Wellia tagera, *Rheede Mal.* 6 *t.* 9 *and* 10.

This tree, which is common in gardens, is also met with in the jungles on the eastern side of the Presidency and in Ceylon.

5. Cassia tomentosa, *Linn.*—A large shrub very common on the Nilgiris and Ceylon mountains at the higher elevations. 6. Cassia Timoriensis, *DC.*—A large shrub common on the slopes of the Nilgiris and other mountains, and in Ceylon. 7. Cassia montana, *Heyne.* A large shrub abundant in dry jungles about Salem, South Arcot, Trichinopoly and further south. 8. Cassia auriculata, *Linn.* A small shrub (called Tangedu in Teligu) very common in the plains throughout the Presidency, and much in use for tanning and dyeing purposes. 9. Cassia alata, *Roxb.* A large shrub introduced from the West Indies, but now quite run wild and met with in our jungles, and known as an effectual remedy for the Malabar ring-worm. 10. C. Goensis, *Dlaz.* A large shrub, foot of the Bombay ghats. None of the above grow to be trees of any size, and with the exception of the Cassia auriculata, which comes under the head of *Forest products* as *Tangedu bark*, they are only of use as fuel. This genus yields the Senna of commerce, much cultivated in some parts of the Presidency, and there are a great many herbaceous or annual species wild throughout India.

DIALIUM. Linn.

For Gen. Char. see letter press to Pl. clxxxi.

1. Dialium ovoideum, *Thw.*—For description, &c. see Pl. clxxxi.

TRIBE—BAUHINIEÆ.

BAUHINIA. Linn.

For Gen. Char. see letter press to Pl. clxxxii.

1. Bauhinia racemosa, *Lam.*—For description, &c. see Pl. clxxxii.

2. Bauhinia Malabarica, *Roxb.*—A large tree, leaves 9 nerved transversely broad-oval cordate at the base glabrous very glaucous beneath, $2\frac{1}{2}$ to 4 inches long by $3\frac{1}{2}$ to 5 broad, petioles $1\frac{1}{4}$-$1\frac{1}{2}$ inches long grandular at the apex and swollen, leaflets rounded at the apex 4-nerved, united considerably above the middle or near the apex, the connecting nerves ending in a bristle between the leaflets, racemes axillary corymbiform almost sessile, longer than the petiole, shorter than the leaves, pedicels 1 inch long bracteoled at the base and again below the middle, calyx funnel shaped regular, 5 cleft pubescent, corol regular, petals spathulate, stamens 10 all fertile very slightly monadelphous at their base, alternate ones shorter, ovary pubescent ; legume long stalked linear slightly falcate, at length glabrous marked longitudinally with waved reticulating lines. *Roxb. Fl. Ind.* ii. *p.* 321.

This tree grows to a large size, it is common in all our western coast forests from South Canara down to Cape Comorin, in the Godavery forests, and in Mysore (Balarangams, 3500 feet), it ascends the mountains to nearly 4000 feet ; in South Canara it is called Cheppura, and in the Godavery forests Puli shinta ; the wood is hard and very serviceable but scarcely known.

3. Bauhinia variegata, *Linn.*—A good sized tree, leaves roundish cordate or rounded at the base upper side glabrous, under when young shortly and softly villous afterwards glabrous, leaflets oval obtuse united far above the middle, nearly parallel 5-nerved, racemes axillary and terminal, calyx spathaceous ovate slightly acuminated 5-toothed at the apex, petals oblong nearly sessile, the upper somewhat larger and on a rather longer claw than the others, fertile stamens 5 with sometimes the rudiments of 1-5 abortive filaments all shortly united at the base, ovary with its stalk free from the calyx tube, legume straight linear acuminated compressed glabrous 5-12 seeded, seeds approximated. *WA. Prod. p.* 296. B. variegata et candida, *Roxb. Fl. Ind.* ii. *p.* 318, 19.

This tree is indigenous in many of our jungles, and is also extensively planted for ornamental purposes in gardens, &c. ; it is very rapid in its growth, and grows most readily from the stool, so it would be an excellent tree to plant for fuel purposes ; the wood is strong and serviceable.

4. Bauhinia purpurea, *L.*—A large tree, leaves roundish cordate at the base coriaceous glabrous, leaflets oval obtuse parallel united to the middle or a little above it, the free portions sometimes overlapping each other 4-5 nerved, racemes terminal panicled, calyx usually cleft to the base of the limb into 2 reflexed segments, the one emarginate, the other 3 toothed sometimes all cohering at the apex and spathaceous, petals oblong lanceolate attenuated at the base, fertile stamens 3 (or 4) long ascending, inner verticel large thick and slightly fimbriated on the edge, ovary stalk cohering on one side with the tube of the calyx, legume long linear pointed with 6-12 rather distant seeds. *WA. Prod. p.* 296.

This ornamental tree is found both in the jungles on the eastern and western side of the Presidency, and is cultivated in gardens ; it is called Kanchan in Teligu, Pedda àre in Tamil, and Sarul in Canarese ; the wood is strong and serviceable, and much in use for ploughs, &c. with the natives.

5. Bauhinia tomentosa, *Linn.*—A shrub or occasionally a small tree 18-20 feet high, branchlets, petioles, peduncles, calyx, legume and under surface of the leaves shortly and softly villous, leaves roundish at the base, leaflets oval obtuse parallel united to above the middle 3 nerved, stipules setaceous, peduncles leaf opposed usually 2 flowered, pedicels each with 3 bracteas at the base, calyx spathaceous ovate shortly acuminated 5 toothed, petals oval, stamens 10 all fertile and united at the base ascending, upper ones gradually shorter, legume flat lanceolate 5-6 seeded. *WA. Prod. p.* 295 ;—*Roxb. Fl. Ind.* ii. *p.* 323.

A shrub or small tree very common on the hills on the eastern side of this Presidency, rarer on the western side, it is very showy, and is much cultivated in gardens and about native temples, &c., the flowers are yellow with a deep purple eye ; it is called Kanchini both in Tamil and Teligu, and in Hindostani Kachnar ; its wood is very tough, and the heart often quite black.

6. Bauhinia retusa, *Roxb.*—A small or middling sized tree, leaves roundish reniform from 2 lobed to scarcely emarginate with a bristle in the notch 3-5 inches each way, leaflets 3-5 nerved smooth on both sides, united to nearly the apex, panicles terminal and axillary composed of many corymbiform racemes, slightly villous, flowers numerous small pale yellow spotted with purple, filaments 3 fertile, inner verticle with several unequal staminodia, legume linear oblong with a round apex flat smooth 6 inches long by 2 broad, seeds 4-8 obovate much compressed smooth dark brown.

This tree I have only seen in the Godavery forests and Bustar country, it grows in the Calcutta Botanical Gardens.

7. Bauhinia Vahlii, *WA.*; 8. Bauhinia Benthami, *Bedd.*; and 9. Bauhinia anguina rank amongst our largest forest creepers, and are very destructive to trees.

TRIBE—AMHERSTIEÆ.

HUMBOLDTIA.

For Gen. Char. see letter-press to Pl. clxxxiii.

1. Humboldtia unijuga, *Bedd.*—For description, &c. see Pl. clxxxiii.

2. Humboldtia Brunonis, *Wall.*—A small tree, branchlets solid, leaves 6-8 inches long, leaflets 2 pair cuneate oblong, with a rather sudden acumination which is obtuse and mucronulate at the apex, glabrous on both sides except the costa and primary veins beneath, 4-6 inches long by 1½-2 broad, lower lobe of the stipules at right angles with the stem rounded at both ends, upper lobe erect narrow acute 6-8 lines long, racemes axillary pubescent about 6 inches long, pedicels about 6 lines long, solitary or twin and furnished at their base with an ovate bract on the common peduncle, bibracteolate at the apex below the calyx, flowers pinkish white, petals 3 about 6 lines long, stamens 5 nearly twice as long as the petals. *Wight Icones tab.* 1606;—(*bad as regards the raceme.*)

A small or middling sized tree very common in Coorg and South Canara, but also extending all down our western forests.

3. Humboldtia laurifolia, *Vahl.*—A small tree, branchlets tumid, joints fistulose, leaves about 1 foot long, leaflets 3-5 pair (generally 5) ovate to oblong with a sudden long finely pointed acumination, glabrous on both sides and prominently reticulated, 4-6 inches long by 1¾-2¼ broad, lower lobe of the stipules small, rounded at both ends, somewhat reflexed 5-6 lines across, nearly equal-sided, upper lobe more or less erect ovate to lanceolate acute about 1½ inches long, racemes axillary 4-6 inches long rufo-pubescent, pedicels about 3 lines long furnished at the base with ovate obtuse reflexed bracts on the common peduncle, bibracteolate at the apex, petals 5, stamens much exserted, ovary hairy. *Wight Icones* 1605.

Very common in the Ambagamowa and Ratnapoora districts in Ceylon, on banks of streams; called Gal-karanda.

4. Humboldtia Vahliana, *Wight.*—Branches solid equal, leaflets 4 pair ovate oblong acuminate, back lobe of the stipules nearly equal sided rounded at both ends, petals 5 nearly equal scarcely equalling the calyx lobes caducous. *Wight Icones tab.* 1607-8.

Nilgiri hills, in jungles about Coonoor; I have not met with this species.

There is a species of Humboldtia growing to a very large tree most abundant in S. Travancore on the banks of rivers and streams in the jungles about Colatoorpolay, but I have not yet procured it in flower or fruit; the branchlets are solid, the common petiole is prominently winged, leaves above a foot long, the leaflets lanceolate up to 9 inches long by about 2 broad; the stipules with the lower lobe transversely reniform, 1 inch broad transversely, and ¾ inch long vertically, upper lobe obliquely ovate unequal sided suberect 1¼ inches long by nearly 1 inch broad, generally more or less overlapped by the lower lobe, the 2 lobes subequal in size or the upper lobe sometimes considerably larger. This is perhaps the same as No. 3, or it may turn out to be a new species; I hope to figure it when perfect specimens are procured.

TAMARINDUS. Linn.

For Gen. Char. see letter press to Pl. clxxxiv.

1. Tamarindus Indica, *L.*—For description, &c. see Pl. clxxxiv.

SARACA. Linn.

For Gen. Char. see letter press to Pl. lvii.

1. Saraca Indica, *L.*—For description, &c. see Pl. lvii.

CRUDIA. Schreb.

For Gen. Char. see letter-press to Pl. of Crudia Zeylanica.

1. Crudia Zeylanica, *Thw.*—For description, &c. see plate of this tree.

TRIBE—CYNOMETREÆ.

HARDWICKIA. Roxb.

For Gen. Char. see letter-press to Pl. xxvi.

1. Hardwickia binata, *Roxb.*—For description, &c. see Pl. xxvi.

2. Hardwickia pinnata, *Roxb.*—For description, &c. see plate of this tree.

CYNOMETRA Linn.

For Gen. Char. see letter press to plate of Cynometra ramiflora.

1. Cynometra ramiflora, *Linn.*—For description, &c. see plate of this tree.

SUB ORDER—MIMOSEÆ.

Flowers 5-(rarely 3-4 or 6-) merous, small regular sessile in spikes or heads or very rarely shortly pedicellate often polygamous, sepals valvate often united, petals valvate (rarely slightly imbricate in genera not Indian,) often united, stamens equal to or double the number of the petals or indefinite, seeds usually flattened with a hard shining testa, albumen none or very scanty, radicle of the embryo short and straight, leaves bipinnate (pinnate in the American genus Inga.)

TRIBE—ADENANTHEREÆ.

ADENANTHERA, Linn.

For Gen. Char. see letter press to Pl. xlvi.

1. Adenanthera pavonina, *L.*—For description, &c. see Pl. xlvi.

2. Adenanthera bicolor, *Moon.*—A middling sized tree 15-20 feet high, branches terete glabrous shining reddish black, petiole tumid at the base, subsulcate and minutely glandulose above, stipules very minute subulate, leaves bipinnate glabrous 8-10 inches long, pinnæ distant 1-3-opposite or subopposite pair, 6-8 foliate, leaflets alternate ovate to ovato-lanceolate minutely apiculate, shining above, opaque beneath, costa and veins reddish, 1-1½ inches long by 6-9 lines broad, petiolules tumid 1 line long, racemes axillary many flowered much shorter than the leaves slightly pilose, peduncles 1½ lines long articulated below the middle 1 bracteolate at the base, flowers glabrous red 1 line long, calyx minute acutely 5-toothed, petals lanceolate, the staminal gland white, the pollen yellow, ovary stipitate about 10 ovuled, legume linear much contorted 5-6 lines broad, seed roundish compressed shining scarlet with the apical half black, funicle 2 lines long. *Thw. En. Pl. Zey. p.* 98.

This tree is not uncommon in the southern part of Ceylon at no great elevation; it is called Mas-mora by the Singhalese.

PROSOPIS. Linn.

For Gen. Char. see letter-press to Pl. lvi.

1. Prosopis spicigera, *Linn.*—For description, &c. see Pl. lvi.

DICHROSTACHYS. DC.

For Gen. Char. see letter-press to Pl. clxxxv.

1. Dichrostachys cinerea, *DC.*—For description, &c. see Pl. clxxxv.

XYLIA. Benth.

For Gen. Char. see letter press to Pl. clxxxvi.

1. Xylia dolabriformis, *Benth.*—For description, &c. see Pl. clxxxvi.

Leucœna glauca is a small introduced tree now common in our gardens.

TRIBE—ACACIEÆ.

ACACIA. Willd.

For Gen. Char. see letter-press to Pl. xlvii.

1. Acacia Arabica, *Willd.*—For description, &c. see Pl. xlvii.

2. Acacia leucophlea, *Willd.*—For description, &c. see Pl. xlviii.

3. Acacia catechu, *Willd.*—For description, &c. see Pl. xlix.

4. Acacia sundra, *Roxb.*—For description, &c. see Pl. l.

5. Acacia ferruginea, *Willd.*—For description, &c. see Pl. li.

6. Acacia Farnesiana, *Willd.*—For description, &c. see Pl. lii.

7. Acacia planifrons, *WA.*—A tree of no great height, armed, branches crowded at the summit, spreading in all directions and forming a flat umbrella-like top, thorns stipulary short conical and curved, leaves bipinnate 1-1¼ inches long, pinnæ 5-10 (generally about 6) pair, leaflets 10-16 pair very small linear obtuse glabrous, petioles glandless compressed and angled, somewhat ciliate when young and terminated at the apex by a subulate process, peduncles axillary aggregated a little shorter than the leaves, glabrous furnished with 2 ovate boat-shaped imbricate bracteoles a little above the base, heads of flowers globose, corol 5 cleft, legume tumid somewhat terete spirally twisted forming a circle about 1¼ inches in diameter. *WA. Prod. p.* 276.

This tree, known as the "Umbrella-thorn" is very common in the southern parts of this Presidency; in some parts of Madura and Tinnevelly it forms jungles to the exclusion of every other tree. It is a most valuable fuel tree, and the Forest Department have commenced plantations of it in Tinnevelly to meet the demand for locomotive fuel; the wood is very strong and serviceable, and in general use for agricultural instruments and many other purposes. WA. describe the tree as having long subulate thorns besides the short recurved ones, but none of my species show this; the tree is called Sále in Teligu.

8. Acacia tomentosa, *Willd.*—A small or middling sized tree, armed, branches terete, spines stipulary spreading, often very large and hard, young shoots, petioles and peduncles clothed with yellowish tomentum, leaves bipinnate about 4 inches long, pinnæ 10-12 pair with an oblong gland below the lowest and an umbilicate one between each of the 1-2 last pair, leaflets 20-30 pair linear obtuse pubescent, peduncles axillary 1-4 together furnished about the middle with 4 small bracteoles, heads of flowers globose, corol 5 cleft, stigma dilated, legume 6-8 inches long flat thin linear-falcate, 6-10 seeded. *WA. Prod. p.* 276;—*Roxb. Fl. Ind.* ii. *p.* 558.

This small tree is found sparingly throughout this Presidency, in the north of Ceylon, and in Bengal; it is used for fuel purposes.

8. Acacia latronum, *Linn.*—Generally a shrub only, sometimes a small tree, thorns white numerous stipulary united at the base often dreadfully large and tapering into a very fine sharp point, inwardly hollow, leaves bipinnate 1-1½ inches long, pinnæ 3-5 pair ½-¾ inch long with a gland on the petiole, leaflets 6-15 pair very small narrow linear obtuse glabrous and without any glands between the pairs, spikes of flowers axillary about 2 inches long usually in pairs, peduncled, cylindric, many flowered, corol 4-5 cleft, legume flat thickish oval-falcate, 3-4 seeded. *WA. Prod. p.* 273;—*Roxb. Fl. Ind.* ii. 559.

This most formidable plant often covers large arid tracts in this Presidency to the exclusion of all other trees, generally in the form of a shrub, but sometimes it becomes a small tree; its flowers are pure white turning to yellow, and are very fragrant; it is used for fuel.

10. Acacia eburnea, *Willd.*—A shrub or sometimes a small tree, the young branches. petioles and peduncles covered with sticky scales, armed, leaves bipinnate, about 1¼ inches long, pinnæ 2-4 pair rather distant with a concave gland between the last pair, leaflets 5-8 pair oval oblong obtuse glabrous slightly distant from each other, thorns stipulary united at the base, small (sometimes very large?) peduncles axillary several together bracteated about the middle, heads of flowers globose small, corol 5 cleft, legumes narrow elongate twisted.

Found in various jungles in this Presidency and in Ceylon, abundant in the Salem district, is used for fuel, seldom more than a shrub.

11. Acacia Roxburghii, *WA.*—A shrub, glabrous, armed, leaves bipinnate, pinnæ 6 pair approximated, leaflets 9 pair closely approximated and almost imbricate, thorns stipulary often longer than the leaves united at the base, heads of flowers axillary globose, legumes linear variously bent. *WA. Prod. p.* 276. Mimosa eburnea, *Roxb. Fl. Ind.* ii. *p.* 558.

Found in jungles on the eastern coast (this I have not met with.)

12. Acacia pinnata, 13. concinna, 14. cœsia, and 15. Intsia all described in Wight's and Arnot's Prodromous, are large thorny climbers and hedge plants, concinna is called Chikai, and a considerable trade is carried on in its saponaceous legumes.

Roxburgh's Acacia suma is the tree I figure as A. catechu; it has always a very white bark. Most of the catechu collected in this Presidency comes from Acacia sundra.

A very great number of Australian Acacias have been introduced on to our hill ranges and they grow remarkably well and rapidly; they chiefly belong to the section which only produce true leaves when very young the apparent leaves being only phylloids (or leaf stalks). Ootacamund and other places on the Nilgiris, Pulneys, &c. are now overgrown with Acacia melanoxylon (a phylloid Acacia) and A. dealbata (a bipinnate Acacia), both introductions from Australia; they are both most valuable for fuel; the former is a very good timber being the blackwood of Australia, the latter spreads to an immense extent by its suckers and unfits all ground near it for any other cultivation, it should only be planted as a screen against the monsoons, or where a firewood jungle is required, and should be excluded from gardens and general plantations.

TRIBE—INGEÆ.

ALBIZZIA. Durazzini.

For Gen. Char. see letter-press to Pl. liii.

1. Albizzia Lebbek, *Willd.*—For description, &c. see Pl. liii.

2. Albizzia odoratissima, *Willd.*—For description, &c. see Pl. liv.

3. Albizzia stipulata, *DC.*—For description, &c. see Pl. lv.

4. Albizzia amara, *Willd.*—For description, &c. see Pl. lxi.

5. Albizzia Wightii, *Grah.*—An unarmed tree, branches terete, young shoots nearly or quite glabrous, leaves bipinnate, pinnæ 9-10 pair with a gland on the petiole below the lowest pair, and between the uppermost pair, leaflets 15-25 pair oblong linear obtuse glabrous, glaucous on the under side, petioles pubescent, stipules subulate, peduncles solitary axillary bearing a capitate head of flowers, legumes thin broadly linear about 6-seeded. *WA. Prod. p.* 274. Mimosa pulchella, *Roxb. Fl. Ind.* ii. *p.* 548.

A tree found in Malabar and the southern provinces; it is nearly allied to Albizzia amara, but differs in its solitary peduncles never forming a terminal raceme, and it is more glabrous.

6. Albizzia procera, *Willd.*—An immense tree, unarmed, nearly glabrous except the young parts, branches terete, leaves bipinnate, pinnæ 3-5 pair with a large gland on the petiole near its base, leaflets 6-12 pair obliquely oval pointed glabrous, panicles axillary or terminal and very large, heads of flowers globular peduncled aggregated, legume thin flat straight linear-lanceolate pointed 8-12 seeded. *Roxb. Fl. Ind.* ii. *p.* 548;—*WA. Prod. p.* 275.

This is a magnificent tree very general throughout the forests of this Presidency, both on the eastern and western side, its wood is very similar to that of A. speciosa, and is much used for building purposes, &c.; it is called Konda Vaghe (Tamil), and other names, signifying that it is the hill or jungle A. Lebbek.

A. lophantha, an Australian tree, has become quite naturalized on the Nilgiris.

PITHECOLOBIUM. Mart.

For Gen. Char. see letter-press to Pl. clxxxviii.

1. Pithecolobium dulce, *Willd.*—For description, &c. see Pl. clxxxviii.

2. Pithecolobium Anamallayanum, *Bedd.*—For description, &c. see Pl. clxxxix.

3. Pithecolobium subcoriaceum, *Thw.*—A large tree, unarmed, 30-40 feet high, the slightly angled branchlets, the petioles, panicles and under surface of the leaflets fusco-puberulous, pinnæ 2-3 pair, leaflets 15-20 pair subcoriaceous linear oblong very unequal sided at the base, 2-7 lines long 1½-2 lines broad, paler beneath; glands large 1 or 2 on the petiole below the pinnæ, and 1 between each pair of pinnæ; heads 3-12 flowered, flowers puberulous, pale green 1-bracteolate, corol more than twice as long as the 5-toothed tubular calyx, stamens very much exserted, ovary on a long stipe pubescent, legume puberulous spirally twisted, about 6-seeded.

A tree not uncommon on the Ceylon mountains 4000-6000 feet elevation, called Meemini by the Singhalese.

4. Pithecolobium bigeminum, *Willd.*—A good sized tree, unarmed, leaves bipinnate or conjugate-pinnate, 1-1½ feet long with 1 or 2 large glands on the petiole below the pinnæ, pinnæ 1-2 pair 9-10 inches long, with a gland between each pair, leaflets 2-4 pair with a gland between each pair, ovate to lanceolate with a blunt mucronulate acumination, glabrous, very unequal at the base, shining above, 4-4½ inches long by 1½-2 broad, petioles 2 lines long, racemes panicled terminal many flowered, flowers in small globose heads, legume spirally twisted yellow red within, seeds oblong 7 lines long by 5 lines broad, testa black shining membranaceous, funicle slender 2 lines long.—Inga bigemina, *WA. Prod. p.* 269. Mimosa lucida, *Roxb. Fl. Ind.* ii. *p.* 544;—*Rheede Mal.* vi. *t.* 12.

A common tree in the western forests of the Madras Presidency up to 4000 feet (very abundant in Wynad), also in Ceylon and in N. E. Bengal; in Ceylon it is called Calateya.

5. Pithecolobium umbellatum, *Willd.*—A small tree, armed, thorns stipulary or often solitary large diverging leaf and flower bearing; leaves bipinnate, pinnæ 1-2 pairs with a gland between each pair, leaflets 3-10 pair with an odd one on the outside below the lowest pair glabrous, linear oblong, obtuse sessile with an inconspicuous gland between each pair, the uppermost pair obovate, peduncles axillary slender 1-2 together bearing a single globular head of few short pedicelled flowers, stamens very long, legumes large many flowered much curved woody slightly scabrous at length shining. *Willd. Sp.* 4. *p.* 1027;—*WA. Prod.* 270. Mimosa concordiana, *Roxb. Fl. Ind.* ii. *p.* 556.

Common on the eastern side of the Madras Presidency, also in the north of Ceylon.

6. Pithecolobium geminatum, *Kœn.*—A shrub or small tree 8-12 feet high, branches simple pubescent filiform flexuose with stipulary spreading spines, leaves conjugately pinnate with a gland between the pinnæ; leaflets 3-5 pair with an odd one on the outside below the pairs, oblong obovate unequal at the base glabrous, without glands between the pairs, petioles pubescent, flowers capitate, heads small globose few flowered on axillary slender peduncles.—Mimosa geminata, *Kœn.* Inga geminata, *WA. Prod. p.* 269.

Ceylon, and the southern part of the Peninsula.

Leguminosæ

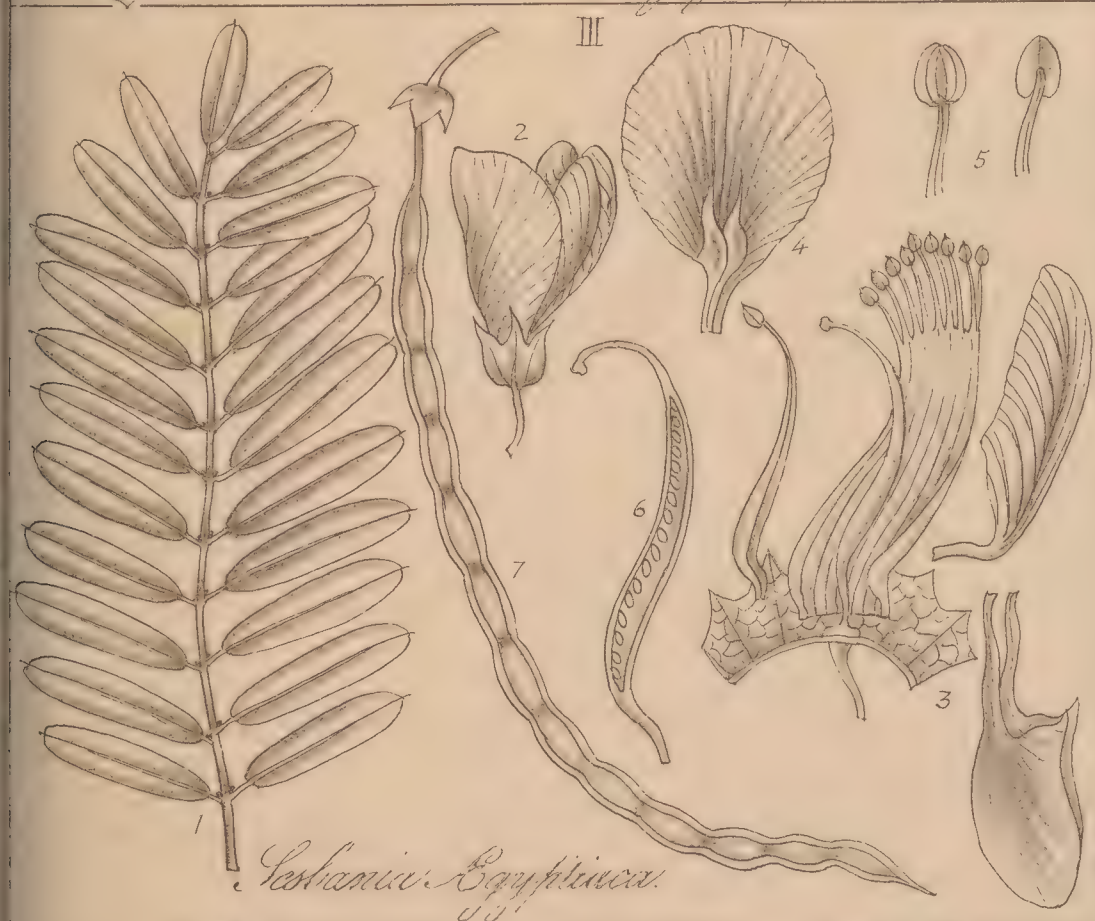
I

Indigofera pulchella

II

Millettia sutherlandi.

III

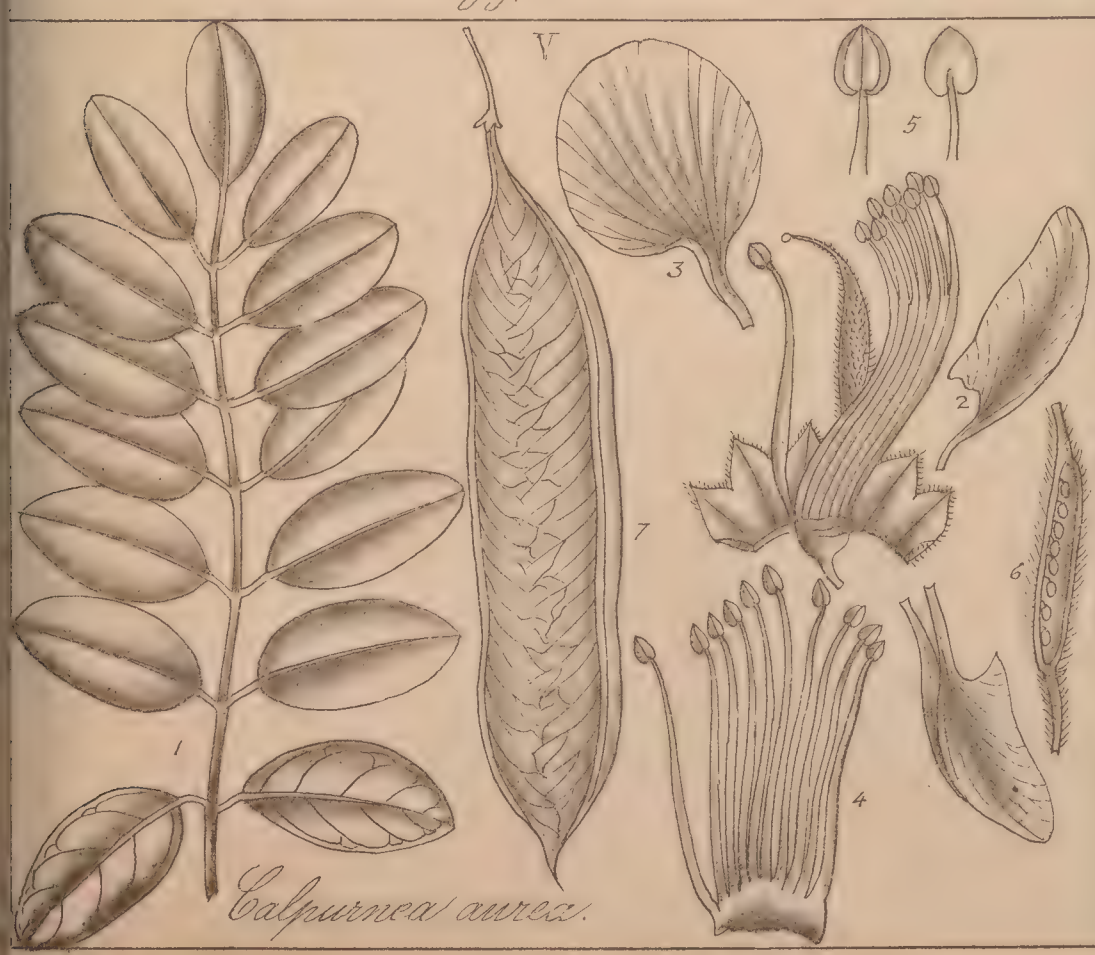


Sesbania Aegyptiaca.

IV

Piptadenia cephalotes

V



Calpurnea aurea.

VI

Sophora interrupta.

Murphy Lith.

ORDER XXXV—ROSACEÆ.

Calyx either enclosing the ovary or adhering to it or quite free 5-rarely 4-lobed with rarely the addition of as many external accessary lobes, petals as many as the true calyx-lobes inserted in the calyx at the base of its lobes, or very rarely hypogynous, very rarely none, stamens numerous or rarely few inserted with the petals free, ovary of 1-2 or more carpels usually distinct at the time of flowering but sometimes combined even then into a single 2-5 celled ovary which is then always inferior or combined with the calyx, ovules 1-2 rarely more in each carpel, styles or sessile stigmas distinct, fruiting carpels either free or variously combined with each other or with the calyx, indehiscent, or rarely opening along the inner edge, seeds exalbuminous or rarely albuminous, embryo with large cotyledons and a short radicle. Trees, shrubs or herbs ; leaves alternate simple or compound, almost always with stipules, flowers in axillary or terminal cymes, or solitary, rarely in simple racemes.

** Ovary superior.*

Tribe I, Chrysobalaneæ.—Flowers generally unsymmetrical, style basal, ovules 2 ascending, radicle inferior.....PARINARIUM.

Tribe II, Puneæ.—Flowers symmetrical, style subterminal, ovules 2 pendulous, radicle superior.....PYGEUM.

*** Ovary inferior.*

Tribe III, Pomeæ.—Ovary 5 rarely 1-4 celled, 2-ovuled, fruit pomaceous with the putamen 2-5 celled or drupaceous with 1-5 pyrenes.

Fruit with 2-5 bony pyrenes... ... ... COTONEASTER.
Fruit 1-5 celled ; endocarps thin ... ... PHOTINIA.

This order which yields the Apple, Pear, Quince, Medlar, Plum, Cherry, Greengage, Peach, Nectarine, Apricot, Almond, Raspberry, Strawberry and Blackberry, is only represented in S. India on the mountains ; it yields us 6 trees—1 Parinarium, a rare tree on the slopes of our western mountains ; 2 Pygeums, one of which is an enormous tree common on all our western mountains ; 1 Cotoneaster, and 2 Photinias, all three of which are common on the Nilgiris, Anamallays, Pulneys, &c. Of indigenous plants not coming within the scope of this Flora, we have as shrubs 3 species of Rubus (Raspberry) and 2 or 3 species of Rosa. And as herbs, Fragaria, (Strawberry) Potentilla, Alchemilla, Agrimonia and Poterium. Of introduced plants, Apples, Pears, Quinces, Peaches, Plums, Raspberries and Strawberries grow and fruit well on our mountains, the Cherry grows but will not fruit, and Nectarines, Greengages and Apricots will seldom produce fruit. Prunus, Maddenia, Pyrus and Stranvesia are Himalayan genera yielding trees, and Prinsepia, Spiræa and Neillia yield shrubs, but none of these genera are indigenous in the Peninsula or Ceylon.

PARINARIUM. Juss.

For Gen. Char. see letter-press to Pl. cxci.

1. PARINARIUM INDICUM, *Bedd.*—For description, &c. see Pl. cxci.

PYGEUM. GÆRTN.

For Gen. Char. see letter-press to Pl. lix.

1. PYGEUM CEYLANICUM, *Gærtn.*—For description, &c. see Pl. lix.

2. PYGEUM WIGHTIANUM, *Bl.*—A middling sized tree, leaves ovate or ovato-lanceolate shortly acuminate, glabrous, $1\frac{1}{2}$-5 inches long by $\frac{3}{4}$-$2\frac{1}{2}$ broad petiole $2\frac{1}{2}$-4 inches long, racemes axillary pilose shorter than the leaves, petals externally very hairy round the margin, drupe glabrous transversely oblong. *Bl. Walps, Ann.* iv. 642 ;—*Thw. En. Pl. Zey. p.* 102. Polyodontia ? Ceylanica, *Wight Icones tab.* 256, *and Ill.* i. 203.

This tree is common in the central provinces of Ceylon 4000-8000 feet elevation, and is called Oonoomoo ; the ripe seeds when bruised have a powerful odour of prussic acid.

COTONEASTER. MEDIK.

Gen. Char. Calyx tube turbinate or campanulate adnate to the ovary, lobes 5 short persistent, petals 5 erect or spreading subsessile, stamens numerous inserted into the mouth of the calyx, filaments subulate, ovary inferior 2-5 celled, style 2-5 free, ovules 2 in each cell erect, drupe ovoid globose or turbinate, pyrenes 2-5 bony, 1 seeded, seed compressed, testa membranaceous or coriaceous, cotyledons plano-convex, radicle inferior. Small trees or shrubs, erect or decumbent, leaves alternate petiolate coriaceous generally evergreen, entire or serrulate, generally villous or white beneath, stipules subulate deciduous, flowers small in axillary or terminal few flowered cymes, or rarely solitary ; drupe small red or black.

1. COTONEASTER BUXIFOLIA, *Wall.*—A large shrub or small tree, very ramous, leaves oval pointed downy above when young, but at length glabrous, densely albo-tomentose beneath, about $\frac{1}{2}$ an inch long by $\frac{1}{4}$ inch broad, petioles $1\frac{1}{2}$-2 lines long, cymes few flowered, flowers small white, peduncles and calyx tomentose. *Wight Icones tab.* 992.

A very rigid dense shrub or small tree common on the higher ranges of the Nilgiris and Pulneys, and in some parts of the latter mountains it forms a very curious feature in the landscape as it grows into most fantastic shapes, and the shrubs are often so rigid and dense that a man can walk along the top of them ; it is called Hooroonay on the Nilgiris, the wood is very dense and elastic and the Todas make the club with which they kill their buffaloes from it.

Analysis of Genera, Pl. XIII, fig 3.

COTONEASTER BUXIFOLIA.

1. Piece of a branch in flower (life-size.)
2. A leaf.
3. A bud
4. A full flower.
5. The same open, petals removed.
6. The same cut vertically.
7. Anthers.
8. Ovary cut transversely.
9. A fruit. (All magnified, drawn from fresh specimens.)

PHOTINIA. LINDL.

For Gen. Char. see letter press to Pl. cxcii.

1. PHOTINIA NOTONIANA, *Wall.*—For description, &c. see Pl. cxcii.

2. PHOTINIA LINDLEYANA, *WA.*—A middling sized or small tree, branchlets lanate, leaves from oblong-lanceolate or elliptic to subobovate, acute or very obtuse, serrulate or when young almost quite entire, lanato-tomentose on both sides when young, at length glabrous above, 3-4½ inches long by about 1½ broad, petioles 1-1½ inches long tomentose, panicles terminal corymbose smaller than in Notoniana, flowers white larger than in Notoniana, pedicels equalling the calyx. *WA. Prod. p.* 302.

A rather common tree on the Nilgiris, particularly on the western side.

ORDER XXXVI—RHIZOPHORACÆ.

Calyx-tube usually adnate to the ovary, sometimes prolonged above it or rarely quite free ; the limb of 4 to about 12 lobes, valvate in the bud. Petals as many as the calyx-lobes, alternate with them, notched cut or jagged or rarely entire, the margins usually induplicate and embracing the anthers. Stamens as many or twice as many as petals or more, inserted with them at the base of the free part or lobes of the calyx ; anthers erect or versatile, 2-celled, opening longitudinally. Ovary more or less inferior or rarely quite superior, 2-or more-celled, with 2 or few pendulous ovules in each cell, or rarely 1-celled by the obliteration of the partition ; style undivided, with an entire or lobed stigma. Fruit inferior or enclosed in the calyx. Seeds solitary or few, with or without albumen. Trees or shrubs. Leaves opposite, simple, entire or slightly toothed, coriaceous. Stipules often large, very deciduous. Flowers axillary, solitary, clustered or in cymes.

Tribe I, Rhizophoreæ.—Ovary inferior, style 1, embryo without albumen and with a thick radicle enlarging rapidly and protruding to a great length from the summit of the capsule, generally before the fruit falls from the tree, leaves opposite. Maritime evergreen trees or shrubs.

Calyx 4-merous, petals entire, anthers 8 subsessile, ovary cells 2, 2-ovuled	...RHIZOPHORA.
Calyx 5-6 merous, petals emarginate appendiculate, stamens 10-12, ovary cells 3, 2-ovuled...	...CERIOPS.
Calyx 5-6 merous, petals lacerated, stamens numerous, ovary 1-celled, 6 ovuled.. ...	...KANDELIA.
Calyx 8-14 merous, petals 2-fid appendiculate, stamens 16-28, ovary cells 1-ovuled ...	..BRUGUIERA.

Tribe II, Legnotideæ.—Ovary inferior, or quite free, style 1, embryo in fleshy albumen, leaves opposite. Forest trees or shrubs.

* *Ovary inferior.*

Stamens 10-16, flowers cymose	..CARALLIA.
Stamens 15-30, peduncles axillary 1-flowered	...WEIHEA.

** *Ovary free.*

Stamens 8, ovary 3-celled	...BLEPHARISTEMMA.

Tribe III, Anisophylleæ.—Ovary inferior, styles 3-4, embryo without albumen, axial, cotyledons rudimentary or obsolete, leaves alternate.

Petals 4, ovary terete	...ANISOPHYLLEA.

This is not an order of much importance to the forester, the 4 genera belonging to the tribe Rhizophoreæ constitute the mangroves, they are small trees or shrubs most abundant about tidal backwaters but confined to those localities ; the 2 species of Carallia are large trees. C. integerrima is common both to S. India and Ceylon, and yields a valuable timber. C. calycina is only found in Ceylon. Weihea is a small tree found in Tinnevelly and Ceylon. Blepharistemma, a shrub only observed in Coorg and Malabar, and Anisophyllea a tree inhabiting Ceylon.

RHIZOPHORA. Linn.

Gen. Char. Calyx-tube adnate, segments 4. Petals 4, entire. Stamens 8 to 12 ; filaments short, anthers long, acuminate connivent. Ovary half-inferior, 2-celled, with 2 pendulous ovules in each cell ; style filiform ; stigma 2-toothed. Fruit ovoid or conical, the persistent calyx-segments reflexed from near the base. Seed solitary, without albumen, the rapidly enlarged radicle penetrating through the summit of the fruit. Trees, leaves entire, cymes axillary.

1. Rhizophora mucronata, *Lam.* ; *DC. Prod.* iii. 32.—A glabrous evergreen tree, with thick branches. Leaves from broadly ovate to oblong-elliptical, obtuse, with a projecting point (often worn off from the old leaves) 3 to 7 inches long by 1-4 broad, coriaceous entire. Stipules rather large, oblong, obtuse, very deciduous. Flowers in axillary dichotomous cymes shorter than the leaves with a pair of short thick concave bracts connate at the base under each fork and under each flower. Calyx sessile within the bracts, about $\frac{1}{2}$ inch long, the segments separating down to the adnate part. Petals shorter than the calyx, the induplicate margins fringed with long hairs. Anthers 8, nearly sessile, 4 embraced by the petals, 4 between them. Style rather thick, nearly as long as the petals. Fruit ovoid, 1 to $1\frac{1}{2}$ inches long. *Arn. in Ann. Nat. Hist.* i. 362 ;—*Wight. Ic. t.* 238 ;—*Benth. Fl. Aust.* ii. *p.* 493. *R.* Candelaria, *WA. Prod. p.* 310.

This tree is common in the tidal back-waters all along the western coast of this Presidency and Ceylon, and other places in the tropics ; it is used for tanning purposes.

Analysis of Genera, Pl. XIII, fig. 4.

Rhizophora mucronata.

1. Portion of a branch in very young fruit (life-size.)
2. A flower.
3. Anthers.
4. A fruit, the radicle just commencing to protrude. (2 & 3 magnified) copied from Dr. Wight's Icones.

2. Rhizophora conjugata, *L.*—A small tree or shrub, leaves oblong or elliptic-lanceolate mucronate coriaceous entire, 4-8 inches long by 1-$3\frac{1}{2}$ broad ; peduncles from the axils of the previous year's leaves solitary shorter than the petiole, thick and fleshy bracteolate at the apex, flowers 2-3 sessile, calyx 4-parted divisions ovate-oblong acute erecto-patent concave coriaceous thickened at the apex nearly twice as long as the petals and much broader, petals linear plane submembranaceous glabrous white a little longer than the stamens, stamens 8-12 generally 11. *Bl. Mus. Bot.* 1. *p.* 134.

With the preceding but not so common.

CERIOPS. Arnt.

Gen. Char. Calyx-tube adnate ; segments 5, rarely 6. Petals as many, emarginate and usually with 1 or more clavate setæ at the top. Stamens twice as many as petals ; filaments filiform, longer than the oblong or linear anthers. Ovary half-inferior, 3-celled, with 2 pendulous ovules in each cell ; style filiform ; stigma undivided. Fruit ovoid or conical, the persistent calyx-segments surrounding it below the middle. Seed solitary, without albumen, the rapidly enlarged funicle penetrating through the summit of the fruit. Trees or shrubs, with the habit and inflorescence of *Rhizophora*, but usually with smaller leaves and smaller more numerous flowers.

1. Ceriops Candolleana, *Arnt.*—A tall evergreen glabrous shrub or small tree. Leaves obovate or broadly oblong, $1\frac{1}{2}$ to 2 inches, or in luxuriant specimens 3 inches long, coriaceous, entire. Flowers in small dense almost capitate cymes, or short recurved axillary peduncles, with a pair of small short thick concave bracts under each ramification, and rather larger ones under each flower. Calyx sessile within the bracts, about 3 lines long, divided down to the adnate part. Petals shorter than the calyx, emarginate, with 2 to 5 clavate setæ irregularly placed in the notch or on the lobes. Stamens alternately inserted opposite the petals and between them, but the anthers embraced in pairs by the induplicate margins of the petals. Fruit conical, about $\frac{1}{2}$ inch long. *Wight Icones tab.* 240. Rhizophora Timoriensis, *DC. Prod.* iii. 32 ;—*Arnt in Ann. Nat. Hist.* i. 364 ;—*Benth. Fl. Aust.* 11. *p.* 494.

Common about the tidal back-waters on the west coast of this presidency, and in Ceylon and other places in the tropics.

Analysis of Genera, Pl. XIII, fig. 5.

Ceriops Candolleana.

1. A portion of a branch in flower (life-size.)
2. A flower, calyx removed.
3. The same, petals removed.
4. Ovary cut transversely.
5. A fruit radicle just commencing to protrude. (3 & 4 magnified) copied from Dr. Wight's Icones.

KANDELIA. Arnt.

Gen. Char. Calyx-segments 5 or 6, rarely 4, linear, shortly united above the ovary, and surrounded at the base by a cup-shaped bract. Petals as many, narrow, divided into filiform segments very deciduous. Stamens numerous, or rarely definite ; filaments

slender, anthers small. Ovary 1-celled with 6 ovules pendulous from a central axis. Style filiform, with a 3-lobed stigma. Fruit oblong, the reflexed persistent calyx-segments surrounding it in the middle. Seed without albumen, the rapidly enlarged radicle penetrating through the apex of the fruit.

The genus only consists of the following species.

1. KANDELIA RHEEDII, *Arnt.*—A glabrous evergreen tree, with thick branches. Leaves oblong, obtuse, 3 or 4 inches long, quite entire, coriaceous, on a petiole of $\frac{1}{2}$ to $\frac{3}{4}$ inch long. Peduncles 1, 2 or 3 in each axil, variable in length but shorter than the leaves, each bearing a compact cyme of 3 to 5 white flowers. Calyx segments 6 or 7 lines long. Petals rather shorter, and falling off so soon after the flower expands, that they may escape observation in the dried specimens. Stamens from 20 to 25. *Bl. Mus. Bot.* i. 134;—*Wight Ill. tab.* 89.

Common about the S. Canara and Malabar tidal back-waters, and also in other parts of the tropics.

Analysis of Genera, Pl. XIII, fig 6.

KANDELIA RHEEDII.

1. Portion of a branch in flower (life-size.)
2. A flower open.
3. A petal.
4. Stamens.
5. A style.
6. Ovary cut vertically.
7. The same cut transversely.
8. A fruit, radicle just commencing to protrude. (2 to 7 magnified) drawn from fresh specimens.

BRUGUIERA. LAM.

Gen. Char. Calyx-tube turbinate or campanulate, adnate at the base to the ovary, the upper portion free, lined by the disk, lobes 10 to 15 or rarely 8 or 9, narrow and thick. Petals as many, 2-lobed, with or without setæ at the top. Stamens twice as many as petals; anthers linear, but usually shorter than the filaments. Ovary inferior, 2-to 4-celled, with 2 pendulous ovules in each cell; style filiform, with 2 to 4 minute stigmatic lobes. Fruit turbinate, crowned by the persistent calyx-lobes. Seeds solitary, without albumen, the rapidly enlarged radicle penetrating through the summit of the fruit. Trees, with the habit of *Rhizophora*. Flowers solitary or few together, on short axillary recurved peduncles.

* *Peduncles* 1-*flowered, flowers large.*

1. BRUGUIERA RHEEDII, *Bl.*—A glabrous evergreen tree, leaves ovate or oblong-elliptical, very shortly acuminate, 3 to 5 inches long, narrowed into a rather long petiole, coriaceous. Stipules oblong, 1 to 2 inches long, very deciduous. Flowers solitary, on short recurved axillary peduncles, without bractes. Calyx very thick and rigid, from a little more than 1 inch to $1\frac{1}{2}$ inches long, the narrow turbinate tube about one-third the whole length, the angles scarcely prominent or sometimes quite obscure, the lobes usually about 12, but variable in number. Petals shorter than the calyx, densely hairy at the base, and the induplicate margins more or less hairy to the end; setæ usually 1 in the notch and 1 to 4 at the end of each lobe, rarely absent. Anthers embraced in pairs by the induplicate margins of the petals. Ovary very short and wholly inferior. Fruit at first crowned by the calyx-limb, which often falls off as the radicle protrudes, the latter assuming a narrow spindle-shaped form, obscurely notched, with about 6 prominent angles. *Bl. En. Pl. Jav.* 92;—*Benth Fl. Aust.* ii. *p.* 494. B. Rumphii and Wightii, *Bl. Mus. Bot.* i. 138. B. Australis, *A. Cunn. in Arnt. Ann. Nat. Hist.* i. 367. B. gymnorrhiza, *WA. Prod. p.* 311 (ex-parte.)

Blume makes the number of setæ on the lobes of the petals a specific distinction, and divides this plant into 3 distinct species. Common in the tidal back-waters on our western coast, and in similar localities in Ceylon and elsewhere in the tropics. The wood is of a yellowish color, hard and durable, used for house-building and for fuel.

Analysis of Genera, Pl. XIV, fig. 1.

BRUGUIERA RHEEDII.

1. Portion of a branch in flower (life-size.)
2. A flower.
3. The same, all the calyx removed, except 2 of the segments, showing the petals.
4. A petal, front view, very hairy at the base, the upper $\frac{1}{2}$ to $\frac{2}{3}$rd glabrous, 2 setæ to each lobe and 1 in the sinus.
5. The same back view.
6. A lobe of a petal showing 3 setæ present, (rarely only 1 is present, more rarely none.)
7. A petal, side view.
8. Anthers.
9. Ovary cut vertically.
10. Ovary cut transversely. All drawn from fresh flowers.

2. BRUGUIERA GYMNORRHIZA, *Lam.*—An evergreen tree, closely resembling *B. Rheedii*. Leaves usually smaller. Flowers as in that species, solitary on short recurved axillary peduncles, but smaller, varying from $\frac{3}{4}$ to nearly 1 inch in length. Calyx-tube

marked with very prominent acute angles ; lobes usually 8 to 10. Petals shorter than the calyx, hairy on the margins, the lobes obtuse, without setæ, but a very short seta often, although not always, in the notch between them. *Bl. Mus. Bot.* i. 136.

Ceylon, south of the island ; has not been observed in this presidency, but probably occurs on the west coast ; probably only a variety of No. 1.

3. Bruguiera cylindrica, *Bl.*—A small tree about 20 feet high, very like the preceding, leaves oblong-elliptical narrowed at both ends, calyx lobes usually about 10, the margin of the petals from the base to the apex densely silvery-hirsute, the lobes each with 1 seta with a long one in the sinus, otherwise as in B. Rheedii.—*Bl. Mus. Bot.* i. 137. B. eriopetala, *WA.* ;—*Wight. Ill. p.* 210. Rhizophora cylindrica, *Linn. Sp. Pl. p.* 635 (ex-parte).

Malabar and Travancore, tidal back-waters, also in similar localities elsewhere in the tropics ; probably only a variety of No. 1.

** * Peduncles several flowered, flowers small.*

4. Bruguiera caryophylloides, *Bl.*—A small or middling sized tree, leaves elliptic or elliptic-oblong acute at both ends, peduncles shorter than or as long as the petiole, 3-or dichotomously 5-flowered, calycine divisions 8, oblong-linear acute, or rather obtuse, petals shorter than the divisions of the calyx erect oblong white, margins puberulous, the lobes each furnished with 3-5 bent subclavate setæ, and a longer seta in the sinus, ovary 2-celled, the protruding radicle 5-6 inches long obtuse or subacute. *Bl. En. p.* 93. Kanilia caryophylloides, *Bl. Mus. Bot.* i. 141. Bruguiera Malabarica, *Arnt* ;—*Wight. Ill.* i. *p.* 210.

Malabar and Ceylon, tidal back-waters, also in similar localities elsewhere in the tropics.

5. Bruguiera parviflora, *WA.*—A small very ramous smooth glossy tree or large shrub, leaves oblong or lanceolate rather obtuse narrowed at the base, polished, 4-5 inches long by 1-2 broad, peduncles axillary 3-or cymosely many-flowered, calyx tube ribbed, 8-cleft, segments acute erect in fruit, petals much shorter than the calyx, obovate, sericeo-puberulous on the outside, each obtuse lobe furnished with 3 rarely 5 subclavate setæ and 1 seta present in the sinus ; ovary 3-celled, protruding radicle cylindric rather obtuse. *WA. Prod. p.* 311 *in Obs.* Rhizophora parviflora, *Roxb Fl. Ind.* ii. *p.* 461. Kanilia parviflora, *Bl. Mus. Bot.* i. 140.

Tidal back-waters on the west coast of this presidency, and at Masulipatam on the east coast, also in similar localities elsewhere in the tropics.

CARALLIA. Roxb.

For Gen Char. see letter press to Pl. cxciii.

1. Carallia integerrima, *DC.*—For description, &c. see Pl. cxciii.

2. Carallia calycina, *Benth.*—A large tree, leaves glabrous entire ovate to obovate shortly acuminate narrowed at the base, parallelo-venose, punctulate beneath, 1½-3 inches long by 1-1¾ inches broad, petiole 1 3 lines long, stipules interpetiolar about 8 lines long, soon deciduous, cymes axillary solitary few-flowered sparingly branched above the middle, about ½ as long as the leaf, bracteoles rotundate retuse, generally mucronulate about 1 line long, flowers subsessile 3 lines long, calyx lobes about as long as the tube, petals white unguiculate, margin inciso-sinuate. *Benth. in Linn. Journ. Bot.* iii. 75 ;—*Thw. En. Pl. Zey. p.* 121.

Ceylon, near Galle in the plains, and central provinces, 4000-5000 feet elevation ; the higher level form has smaller more coriaceous leaves.

WEIHEA. Spr.

For Gen Char. see letter press to Pl. cxciv.

1. Weihea Zeylanica, *Gard.*—For description, &c. see Pl. cxciv.

BLEPHARISTEMMA. Wall.

Gen. Char. Calyx ebracteolate at the base, tube ovoid terete adnate to the base of the ovary, limbs shortly 4-lobed at the apex, lobes small triangular erect, disk 8-toothed at the base of the calyx but nearly free from it, petals 4 inserted at the bottom of the calyx and adnate to the base of the disk, as long or longer than the calyx, unguiculate, lacerated at the apex, stamens 8 inserted into the margin of the disk between the teeth, filaments hairy alternately shorter, anthers small oblong, ovary ovoid free 3-celled, style obsolete or as long or nearly twice as long as the calyx, stigma 3-lobed or truncate, ovules 2 in each cell pendulous collateral, fruit unknown. A shrub or small tree, glabrous except the young buds stipules and inflorescence, leaves opposite crenate penniveined, stipules interpetiolar caducous, flowers small in axillary cymes.

1. Blepharistemma corymbosa, *Wall.*—A shrub or small tree, leaves oval elliptic or oblong acute or obtuse irregularly crenate, acute or rounded at the base, 4-5½ inches long by 1½-3 inches broad, cymes axillary many flowered, peduncles about ½ inch long, pedicels about 1 line long, calyx 1½ line long externally hirsute. *Benth. in Journ. Lin. Soc. vol.* iii. *p.* 78. Dryptopetalum membranaceum, *Miq. in Pl. Hohenack. n.* 713.

I have found this on maidans at Tellicherry (Malabar), sea level ; and on the Coorg mountains, 2500 feet ; the plants differ slightly, but I should not like to separate them as species. The Coorg plant has much smaller and more membranaceous leaves, is a small tree or large shrub, and has no style and a 3-lobed stigma. As far I have observed, they both have all their flowers fertile, but in the Tellicherry plant (which is a very small shrub), some of the flowers have the style and petals equal in length to the calyx, others the petals a 3rd longer and the style double as long, the stigma is truncate in both these flowers, and the ovaries and stamens the same in both.

Analysis of Genera, Pl. XIV, fig. 2.

BLEPHARISTEMMA CORYMBOSA.

1. A portion of a corymb showing 2 of the flowers with a long style, and one with a short one.
2. A long styled flower open, stamens inserted into the sinuses of the teeth of the disk, petals into the calyx tube at the bottom of the disk.
3. Ovary and truncate style.
4. A petal and stamen, both ciliate.
5. Anthers, front and back view.
6. Ovary cut vertically.
7. The same cut transversely.
8. A short styled flower opened, showing that the petals are shorter.
9. Ovary from the same, showing the short style (internal structure the same as 6 & 7.)
10. A short styled flower. (All magnified dissections from the Tellicherry plant.)
11. Ovary with a sessile 3-lobed stigma drawn from the Coorg plant.

ANISOPHYLLEA. BROWN.

For Gen. Char. see letter press to Pl. cxcv.

1. ANISOPHYLLEA ZEYLANICA, *Benth.*—For description, &c. see Pl. cxcv.

ORDER XXXVII—COMBRETACEÆ.

Calyx-tube adnate to the ovary at the base, narrowed above it and sometimes elongated ; limb usually campanulate, with 4 or 5, rarely more teeth, lobes or segments, valvate or very rarely induplicate or imbricate. Petals none, or as many as calyx-lobes, usually small imbricate or valvate. Stamens as many or twice as many as calyx-lobes, rarely indefinite, inserted on the calyx ; anthers opening in longitudinal slits or (in *Gyrocarpeæ*) in 2 valves. Ovary inferior, 1-celled, with 2 or more pendulous ovules, or (in *Gyrocarpeæ*) with 1 only ; style filiform or scarcely any with an entire terminal stigma. Fruit coriaceous, chartaceous or drupaceous, indehiscent or rarely dehiscent. Seed solitary, pendulous, without albumen ; cotyledons convolute or folded, very rarely flat inside and furrowed outside ; radicle short, superior. Trees, shrubs or woody climbers. Leaves alternate or opposite, entire, without stipules. Flowers in axillary or terminal racemes spikes or heads, or (in *Gyrocarpeæ*) in cymes. Bractes usually small, bracteoles sometimes larger, often wanting.

SUB-ORDER COMBRETEÆ.—Anthers opening by slits, ovules 2 or more, flowers in racemes spikes or heads.

* *Petals* 0.

Calyx tube terete not prolonged beyond the ovary, flowers spicate	...TERMINALIA.
Calyx tube 2 winged at the base, flowers densely capitate	...ANOGEISSUS.

* * *Petals* 5.

Calyx tube persistent, stamens 5-10, leaves alternate	...LUMNITZERA.

SUB-ORDER GYROCARPEÆ.—Anthers opening in 2 valves, ovules solitary, petals 0, flowers in cymes.

Calyx lobes imbricate, 2 increasing in fruit...	...GYROCARPUS.

An order of considerable importance to the forester. 6 species of Terminalia being large valuable timber trees common to almost all our dry forests. Anogeissus latifolius, also a valuable timber, is equally common. Anogeissus acuminatus, a very beautiful tree with a valuable timber is only found towards the northern part of our eastern coast. The Gyrocarpus is a soft light-wood tree common everywhere. The Lumnitzera a small sea-coast tree. 1 species of Terminalia is peculiar to Ceylon, and 1 to the Bombay Presidency. Of plants not coming within this Flora, the genus Combretum yields 3 large woody climbers. Quisqualis 1 indigenous and 1 introduced climber, and Calycopteris one scandent shrub ; there are no herbaceous plants in the order.

TERMINALIA. LINN.

For Gen. Char. see letter-press to Pl. xvii.

1. TERMINALIA TOMENTOSA, *Roxb.*—For description, &c. see Pl. xvii.

2. TERMINALIA PANICULATA, *Roxb.*—For description, &c. see Pl. xviii.

3. Terminalia Arjuna, *Roxb.*—For description, &c. see Pl. xxviii.

4. Terminalia Belerica, *Roxb.*—For description, &c. see Pl. xix.

5. Terminalia catappa, *Willd.*—For description, &c. see Pl. xx.

6. Terminalia chebula, *Retz.*—For description, &c. see Pl. xxvii.

7. Terminalia parviflora, *Thw.*—A large tree, young branches and petioles ferrugineo-pilose, at length glabrous, leaves subopposite oblong abruptly acuminate entire glabrous, beneath very minutely reticulate, without glands, 3-5 inches long by $1\frac{1}{2}$-$2\frac{1}{2}$ broad, petiole without glands 3-5 lines long, spikes pilose terminal paniculate nearly equalling the leaf ; flowers small white, calyx campanulate shortly toothed externally pilose internally villous, drupe ovoid fleshy subpentagonal glabrous greenish 1 inch long, putamen deeply and broadly 5-sulcate. *Thw. En. Pl. Zey. p.* 10.

Ceylon, central provinces, up to an elevation of 4000 feet, called Hampalanda.

8. Terminalia gella, *Dalz.*—A large handsome tree, leaves broadly oval puberulous on both sides, when young lanately tomentose, 9 inches long by 5 broad, finely reticulated and destitute of glands, petioles without glands, spikes axillary solitary tomentose shorter than the leaf, lower flowers fertile short pedicelled, upper male sessile, all woolly within, calyx segments triangular acute revolute after flowering, drupe spherical sericeous 9-10 lines in diameter. *Dalz. Hook. Journ. of Bot.* iii. 227.

A rare tree on the Concan ghats discovered and described by Mr. Dalzell. I have never met with it ; it must be closely allied to T. chebula, but is destitute of glands ; the fruit (myrobalans) has the same properties as that of T. chebula and Belerica, and is equally an article of commerce.

ANOGEISSUS. Wall.

For Gen. Char. see letter-press to Pl. xv.

1. Anogeissus latifolius, *Roxb.*—For description, &c. see Pl. xv.

2. Anogeissus acuminatus, *Roxb.*—For description, &c. see Pl. xvi.

LUMNITZERA. Willd.

Gen. Char. Calyx tube produced above the ovary, but scarcely contracted, the limb campanulate, shortly 5-lobed or 5-toothed. Petals 5, spreading. Stamens 10 or fewer. Ovules 2 to 5, style filiform, with a minute stigma. Fruit ovoid-oblong crowned by the persistent calyx, narrowed and flattened at the base, hard and almost woody. Seed linear, with convolute cotyledons. Maritime trees or shrubs. Leaves crowded at the ends of the branches, obovate or cuneate, thick entire or slightly crenate. Flowers in short racemes. Bracteoles 2, adnate to the base of the calyx-tube, persistent but not enlarged after flowering. *Benth. Fl. Aust.* ii. *p.* 503.

1. Lumnitzera racemosa, *Willd.*—A middling sized tree or tall shrub, leaves obovate or oblong-cuneate, very obtuse often 2 inches long thick and fleshy, flowers small white in axillary racemes which are about as long as the leaves, calyx about 4 lines long when in flower, 6 lines when in fruit, the lobes and teeth very short, petals $1\frac{1}{2}$ lines long and the stamens very little shorter. *DC. Prod.* iii. 22. Petaloma alternifolia, *Roxb. Fl. Ind.* ii. *p.* 373. Kada Kondei, *Rheede Mal. vol.* vi. *t.* 37.

This tree is common in the salt marshes and tidal backwaters on the western coast of this presidency, and I have also observed it at Balasore on the eastern coast, and it is common in the delta of the Ganges, and in other parts of tropical Asia and in Australia, it flowers in March and April ; the wood is remarkably strong and durable, and is in use for posts and house building, and for fuel.

GYROCARPUS. Jacq.

For Gen. Char. see letter-press to Pl. cxcvi.

1. Gyrocarpus Jacquini, *Roxb.*—For description, &c. see Pl. cxcvi.

Leguminosæ Rosaceæ Rhizophoraceæ

I

Oxsalpinia Lapsan

II

Parkinsonia aculeata

III

Cotoneaster laxiflora

IV

Rhizophora mucronata

V

Cerispes Bamiottiana

VI

Kandelia Rheedii

Dumphy, Lith.

ORDER XXXVIII—MYRTACEÆ.

Calyx-tube adnate to the ovary at the base or up to the insertion of the stamens ; limb more or less divided (usually to the base) into 4 or 5 very rarely 3 or more than 5 lobes or teeth, or reduced to a narrow border, or entirely wanting ; lobes usually imbricate or open in the bud. Petals usually as many as calyx-lobes, very much imbricate in the bud, the external one sometimes larger than the others but usually all nearly equal when expanded, sometimes all concrete and falling off in a single operculum, or rarely entirely wanting. Stamens indefinite, usually numerous or rarely few and definite, inserted in one or several rows on a disk, either thin and lining the calyx-tube above the ovary and forming a thickened ring at its orifice or thicker and forming a ring close round the summit of the ovary ; filaments free or rarely united into a ring or tube at the base, or into as many bundles as there are calyx-lobes ; anthers 2-celled, versatile or attached by the base, the cells opening in longitudinal slits, or rarely in terminal pores. Ovary inferior or rarely almost superior, but enclosed in the calyx-tube, sometimes 1-celled, with a placenta attached to the base or adnate to one side, more frequently 2 or more celled, with the placentas in the inner angle of each cell, very rarely 1-celled, with 2 parietal placentas. Style simple, with a small or a capitate or peltate, very rarely lobed stigma. Ovules 2 or more to each placenta, in 2 or more rows, or very rarely solitary, erect pendulous or laterally attached, anatropous or amphitropous. Fruit inferior, adnate to the calyx-tube, and crowned by the persistent limb or marked by its scar when deciduous, or very rarely half or almost wholly superior, and surrounded at the base by the persistent calyx-tube, either capsular and opening loculicidally at the summit, in as many valves as cells, or indehiscent, dry, and 1-seeded, or succulent and indehiscent. Perfect seeds usually very few or solitary in each cell, even when the ovules are numerous, or rarely numerous and perfect ; testa either thin and membranous or crustaceous, fleshy or bony. Albumen none, or very scanty near the hilum. Embryo straight or variously curved, fleshy with minute cotyledons at one end, or with large flat, or variously folded cotyledons, or with thick fleshy distinct or consolidated cotyledons, and an exceedingly short radicle, or rarely apparently homogeneous, the cotyledons inconspicuous before germination. Abortive ovules in many capsular genera enlarged without being fertilized and simulating the seeds, but of a hard nearly homogeneous, woody or granular consistence. Trees or shrubs, very rarely undershrubs. Leaves simple, entire or rarely obscurely crenate-toothed, opposite or less frequently alternate, more or less dotted in all but most of the *Lecythideæ*, with small resinous glands, either pellucid or black and superficial, often scarcely visible when the leaf is thick. Stipules none or rarely very minute and fugacious. Flowers solitary or in racemes, panicles or cymes, axillary or apparently terminal from the terminal bud not gowing out till after the flowering is over. Bracts solitary at the base of the peduncles, or forming an imbricate involucre from the abortion of the lower flowers. Bracteoles 2 at the base of or on the pedicel, sometimes very small or abortive, and often exceedingly deciduous.

Tribe I, Myrteæ.—Ovary divided into 2 or more cells or very rarely 1 celled with 2 parietal placentas, fruit an indehiscent berry or rarely a drupe indehiscent, leaves opposite or very rarely alternate.

Ovary with 2-4 or 6 rows of superposed ovules separated by vertical septa, the ovules themselves separated by transverse septa (1-2 or 3-celled with double rows of ovules in each cell all separated by spurious septa) ..	RHODOMYRTUS.
Ovary 2 or rarely 3 celled with many rarely 2-ovules in each cell, embryo thick and fleshy either indivisible or with 2 thick fleshy cotyledons and a short radicle	EUGENIA.

Tribe II, Lecythideæ. (Sub-tribe Barringtonieæ.)—Ovary divided more or less completely into 2 or more cells, fruit indehiscent hard and fibrous or fleshy, leaves alternate or crowded at the ends of the branches, large, very rarely dotted.

Stamens all perfect, fruit angular fibrous with a single seed	BARRINGTONIA.
Outer or inner stamens or both without anthers, fruit ovoid or globular not angular with several seeds in pulp...	CAREYA.

The tribe Myrteæ, or rather the genus Eugenia, is a most important one to the forester, as the latter gives 50 or 60 species of trees or large shrubs most of them being valuable timber, they are generally known by the native name of Naval ; a few are found in the plains, but they are most characteristic of the moist woods or sholas on our higher mountains. Rhodomyrtus has only 1 species, a large shrub common on our higher mountains, and to this tribe belongs the Guava (Psidium Guyava, Linn.) so common in our gardens, but an introduction from tropical America, and also Rhodamnia spectabilis (Monoxa, Wight Icones tab. 524.) Nelitris paniculata (Wight Icones tab. 521) and Pimenta acris (Wight Ill. vol. ii. tab. 97) trees introduced into our gardens and of Asiatic origin, though not indigenous to the Peninsula.

The tribe Lecythideæ yields 3 species of Barringtonia, handsome trees confined to the plains or at no great elevation, and commonest near the sea, all valuable timber ; and one species of Careya, a good sized tree most abundant throughout the presidency and ascending the hills to 5000 feet elevation and also yielding a good timber.

Very numerous species of trees and shrubs belonging to this order have been introduced on our mountain ranges from Australia, the most important of which are the Eucalypti, which belong to the tribe Leptospermeæ (differing from Myrteæ in their fruit opening at the summit in as many valves as there are cells), the Eucalyptus globulus (blue gum) and E. obliqua (Stringy bark) are the most common of these, and they impart quite a new feature to the scenery on our mountains ; most of the species yield valuable timbers ; to the same tribe belong the Leptospermum and Melaleucas (bottle brushes), very ornamental shrubs, many species of which now grow in our hill gardens.

RHODOMYRTUS. DC.

Gen. Char. Calyx-tube turbinate, oblong or nearly globular, scarcely or not at all produced above the ovary ; lobes 4 or 5, herbaceous, persistent. Petals 4 or 5, spreading. Stamens numerous in several series, free ; filaments filiform ; anthers versatile or attached near the base, with parallel cells opening longitudinally. Ovary really 1-2-or 3-celled, with several ovules in 2 rows in each cell, but owing to spurious dissepiments interposed between the ovules, appearing either 2-4-or 6-celled or divided into numerous 1-ovulated cells superposed in 2, 4, or 6 rows ; style filiform with the stigma usually peltate. Fruit a berry or almost a drupe, globular, ovoid, or cylindrical, divided into 1-seeded cells or nuts superposed in 2 to 6 or almost in a single row. Seeds compressed, reniform, or nearly orbicular, with a hard testa, embryo horse-shoe-shaped or ring shaped, with a long radicle and very small cotyledons. Trees or shrubs more or less tomentose or villous. Leaves opposite, penniveined or triplinerved. Peduncles axillary, bearing 1 or 3

or rarely a raceme or cyme of 5 or more flowers, pink or white. Bracts small, or when the peduncles are several-flowered the lowest sometimes leaf-like. Bracteoles small and deciduous. *Benth. Fl. Aust.* iii. *p.* 271.

1. Rhodomyrtus tomentosa, *DC.*—A large shrub, the branches, the under surface of the leaves, the peduncles and calyx hoary with a very short soft tomentum, leaves oval-elliptic obtuse 1-2½ inches long with 3 or rarely 5 thick prominent nerves starting from near the base, peduncles axillary shorter than the leaves bearing 1-3 rather large pink flowers. Calyx tomentose with 2 small bracts at the base, petals ½-¾ inch in diameter tomentose outside. *DC. Prod.* iii. 240 ;—*Wight Icones t.* 522.

Abundant on the higher mountains in this presidency and in Ceylon, at Ootacamund it is known as the hill gooseberry and the fruit is eaten raw or made into jams, &c., it is called by the Burghers Thaontay ; the wood is white with a pink heart, close grained and dense, cuts like cheese but splits in seasoning, it is excellent for small turnery purposes.

Analysis of Genera, Pl. XIV, fig. 3.

Rhodomyrtus tomentosa.

1. A piece of a branch in fruit.
2. Under surface of a leaf.
3. A full flower.
4. A petal, inside view.
5. The same, outside.
6. Anthers, front and back view.
7. Style.
8. Flower cut vertically, showing the insertion of the stamens, and the ovary with transverse spurious cells 3 on each side, (there are sometimes 4-6).
9. A fruit cut vertically.
10. The same cut transversely.

EUGENIA. Linn.

Gen. Char. Calyx-tube from globular to narrow-turbinate, not at all or more or less produced above the ovary ; lobes 4, very rarely 5, from large and imbricate to very short and scarcely prominent above the truncate margin. Petals 4, very rarely 5, either free and spreading, or more or less connivent or connate, and falling off in a single calyptra. Stamens numerous, in several series, free or obscurely collected in 4 bundles ; anthers versatile, usually small, the cells parallel or very rarely divaricate, opening longitudinally. Ovary 2-celled or very rarely 3-celled, with several ovules in each cell, or only 2 (in an American section). Fruit a berry or sometimes almost a drupe, or nearly dry with fibrous rind. Seeds either solitary and globose, or few and variously-shaped by compression ; testa membranous or cartilaginous, embryo thick and fleshy, with a very short radicle, the cotyledons either united in an apparently homogeneous mass or more or less separable. Trees or shrubs. Leaves opposite, penniveined. Flowers either solitary in the axils, or in lateral or terminal trichotomous cymes or panicles. *Benth Fl. Aust.* iii. 280. Jossinea, *Comm.* Jambosa, *DC.* Syzygium, *Gærtn.* Acmena, *DC.* Strongylocalyx, *Bl.* Gelpkea, *Bl.* Cleistocalyx, *Bl.* Cerocarpus, *Hassk.* Macromyrtus, *Mig. Fl. Ind. Bat.* Microjambosa, *Bl.* Caryophyllus, *Linn.* Greggia, *Gærtn.* Guapurium, *Juss.* Syllysium, *Mey. and Schau.* Plinia, *Linn.* Phyllocalyx, *Berg.* Catinga, *Aubl.* Hexachlamys, *Berg.* Myrciaria, *Berg.* Siphoneugenia, *Berg.*

The different sections, Syzygium, Acmena, Strongylocalyx, Jambosa and Eugenia, have till lately been treated by most botanists as separate genera. The Syzygiums are most abundant in all our mountain woods, and many of them are very large trees, always glabrous, yielding most valuable timber ; they are distinguished by their small flowers and by the petals generally cohering and falling off like a lid. The Acmenas only differ from Syzygium in their calyx tube being elongated and tapering at the base ; they are small trees, very showy when in blossom. Jambosa, Strongylocalyx and Eugenia have free and spreading petals, the 2 former are glabrous and have their flowers in trichotomous panicles or cymes (except Wightii), and the calyx tube more or less produced above the ovary, prominently lobed and the lobes generally persistent ; the last named are almost always more or less downy in their young parts and have short generally 1 flowered or rarely 3 flowered pedicels, solitary or 2 together in the axils or at the old nodes, calyx tube not at all or scarcely produced above the ovary. The Jambosas are beautiful trees in the moist mountain forests generally at no great elevation, and Strongylocalyx is a fine large mountain tree ; the trees of the Eugenia section are generally small and not of such value as the Syzygiums. Eugenia floccosa is a very beautiful tree characteristic of the S. Tinnevelly mountains.

SECTION SYZYGIUM.—*Flowers in trichotomous panicles or cymes, calyx tube more or less produced above the ovary, the border entire or very shortly sinuately lobed or with more prominent but very deciduous lobes, petals more or less cohering in a calyptra and falling off together. rarely spreading and separately deciduous, flowers small and inconspicuous. Perfectly glabrous trees or large shrubs.*

1. Eugenia Jambolana, *Linn.*—For description, &c. see Pl. cxcvii.

2. Eugenia nervosa, *DC.*—A very large tree, quite glabrous, leaves ovate or oval-elliptic, obtuse or shortly acuminate, 3-6 inches long usually of a pale green, the principal lateral veins distant from each other and very prominent underneath, panicles usually arising from the leafless nodes of the former year's wood, 3-4 inches long, very spreadingly branched from the base, the flowers usually 3 together, sessile at the ends of the ultimate branches, calyx not distinctly toothed, berry very juicy.—Syzygium nervosum, *DC. Prod.* iii. 260 not E. nervosa, *DC. p.* 284 ;—*Benth. Fl. Hongkong p.* 119. Eugenia operculata, *Roxb.* ;—*Wight Icones* 552. E. Paniala, *Roxb.* ;—*Wight. Icones* 615, and E. cerasoides, *Roxb.* ;—*Wight Icones* 616. Syzygium nodosum, costatum and angkolanum, *Mig. Fl. Ned. Ind.* i. 448.—Nearly allied to Jambolana in habit and inflorescence, but with fewer and much more prominent veins, shorter petioles, and larger flowers.

This large and valuable timber tree is found at low elevations on the mountains on the west side of this Presidency and in Ceylon up to 3000 feet, its timber is similar to that of Jambolana and useful for building purposes, &c. The tree is widely spread over India and the Archipelago and in S. China.

3. Eugenia calophyllifolia, *Wight.*—A large spreading tree with a fine umbrageous head, young branches 4 sided, leaves glabrous oval obtuse obovate or orbicular, very coriaceous, about 1 inch long by $\frac{3}{4}$ inch broad, veins parallel but inconspicuous, reticulated beneath when dry, not dotted, cymes terminal corymbose short peduncled many flowered, calyx repandly 4 toothed, petals orbicular falling off as a single lid, fruit oval oblong succulent dark purple, edible. *Wight Icones tab.* 1000.

A large beautiful tree abundant in the moist woods on the higher ranges of the Nilgiris and in Ceylon (Adam's Peak), its very small Calophyllum-like thick leaves distinguish it from all the other species, its timber is valuable and used for building and other purposes, it is in flower more or less all the year round.

4. Eugenia Arnottiana, *Wight.*—A very large spreading tree but with a low trunk, leaves glabrous elliptic with a longish acumination coriaceous shining obscurely dotted, 2-3 inches long by 1-1$\frac{1}{2}$ inches broad, petioles $\frac{1}{2}$ to nearly 1 inch long, cymes terminal dense corymbose, the peduncle and its branches acutely or obtusely 4 sided, flowers cream-colored numerous small sessile or subsessile (when in bud of a lively crimson), bracteoles long ovate lanceolate crimson very caducous, calyx shortly turbinate, limb cup-shaped shortly and bluntly 4 toothed or subentire, petals falling off in a lid or expanding and falling off separately, fruit oblong oval dark purple succulent. *Wight Icones tab.* 999. Syzygium densiflorum, *Wall.*;—*WA. Prod. p.* 329.

This is one of the largest and commonest trees in the moist woods on the Nilgiris and Pulneys, 6-7000 feet elevation, and I also have it from 4000 feet on the Anamallays; it is a valuable timber and generally known under the name of Nawal, the fruit is eaten but it is very astringent.

5. Eugenia assimilis, *Thw.*—A middling sized tree, leaves glabrous lanceolate to obovate, or broadly oval abruptly acuminate or obtuse narrowed or rounded at the base, 2-5 inches long by 1$\frac{1}{4}$-3 inches broad, petioles 2-7 lines long, cymes crowded at the apex of the branches or in the upper axils $\frac{1}{2}$ or less than $\frac{1}{2}$ the length of the leaves, peduncles obtusely 4 sided, flowers rather large, 6-7 lines in diameter, petals falling off in a lid, fruit spherical blackish purple about $\frac{3}{4}$ inch in diameter.—*Thw. En. Pl. Zey. p.* 116.

Ceylon, central provinces, up to 5000 feet elevation, the leaves are larger and the flowers 3 times larger than in Arnottiana, and the fruit differs in shape.

6. Eugenia montana, *Wight.*—A very large tree, young shoots acutely 4 angled winged and concave between the wings, leaves occasionally alternate or subalternate coriaceous glabrous lanceolate with a short blunt acumination to obovate or orbicular obtuse, 5-6 inches long by about 2$\frac{1}{2}$ broad, petioles 3-5 lines long, cymes terminal very numerous corymbose many flowered, peduncles angled and often very flat and broad, flowers small sessile or subsessile in threes at the apex of each extreme division, calyx obtusely 4 lobed, petals adhering and falling off as a lid, fruit globose purple size of a currant crowned by the calyx. *Wight Icones tab.* 1060.

A very common tree in the woods of the higher ranges of the Nilgiris, the leaves are often alternate or subalternate; it is to be met with in flower at all seasons; the wood is in use for building purposes, &c.

7. Eugenia sylvestris, *Moon.*—A very large tree, leaves glabrous from lanceolate with a blunt point to obovate or spathulate obtuse coriaceous, about four inches long by 1$\frac{1}{2}$-2$\frac{1}{2}$ broad, petioles $\frac{3}{4}$ inch long, cymes corymbose terminal crowded or from the extreme axils longish peduncled, flowers very small, fruit spherical black-purple $\frac{1}{2}$ inch in diameter. *Wight Icones tab.* 532.

Ceylon, up to 3000 feet elevation, called Aloobo.

8. Eugenia Neesiana, *Arnt.*—A good sized tree, leaves subsessile or petiolate oblong lanceolate blunt pointed subcoriaceous pellucid dotted, penniveined, cymes terminal and from the upper axils laxly corymbose trichotomous, peduncles 4 sided, the partial ones umbellately 3-7 flowered, pedicels half the length of the shortly turbinate slightly 4 lobed calyx, flowers small, petals free o cohering and falling off as lid. *Wight Icones tab.* 533.

Ceylon, common up to 3000 feet, called Panookaara. I have this or a closely allied species (with the leaves petioled) from the S. Tinnevelly mountains.

9. Eugenia revoluta, *Wight.*—A middling sized tree, branches obscurely 4 angled, leaves from lanceolate with a small blunt point to oval or broadly obovate very obtuse, very coriaceous, often revolute at the margins, very variable in size, penniveined, polished above, dull glaucous beneath, cymes terminal longish peduncled, flowers sessile congested at the ends of the branchlets, calyx 4-5 toothed petals free or cohering and falling off as a lid, fruit spherical reddish, the size of a small cherry. *Wight Icones tab.* 534.

Ceylon at an elevation of 3000 to 6000 feet.

10. Eugenia androsœmoides, *Linn.*—A large handsome tree, glabrous, leaves coriaceous, penniveined ovato-lanceolate acuminate, sessile, cordate, stem clasping, 6-8 inches long by about 3 inches broad; cymes corymbose much shorter than the leaves terminal and axillary, flowers small, calyx slightly 4 toothed, petals cohering and falling off as a lid, fruit subspherical 1 inch in diameter.—Eug. cordifolia, *Wight Icones tab.* 544;—*Thw. En. Pl. Zey. p.* 116.

Ceylon, Ambagamwa and Ratnapoora, up to 3000 feet elevation, a most distinct and beautiful species.

11. Eugenia Malabarica, *Bedd.*—For description, &c. see Pl. cxcix.

12. Eugenia alternifolia, *Wight.*—For description, &c. see Pl. cxcviii.

13. Eugenia grandis, *Wight.*—A large tree, glabrous, leaves coriaceous shining obovate abruptly and very shortly acuminate obtuse or retuse, narrowed at the base, 4-8 inches long by 3-3$\frac{1}{2}$ inches broad, veins numerous subparallel prominent on both sides, petioles $\frac{3}{4}$-1 inch long, panicles terminal and from the upper axils shorter or about as long as the leaves, flowers large, (for the genus), calyx attenuated into a short pedicel the 2 together $\frac{1}{2}$ an inch long, and the former 4 lines broad, segments short rounded,

petals distinct and falling off separately. *Wight. Ill.* ii. 17, *and Icon.* 614. Eug. firma, *Wall. cat.* 3603*A*. *not DC. Prod.* iii. *p.* 282. Syzygium firmum, *Thw En. Pl. Zey. p.* 417, and S. montana, *Thw. l. c. p.* 116. *(*not *Wight.)* E. cymosa, *Roxb. Fl. Ind.* ii. 492, not *Lam.* Jambosa grandis and firma, *Blume Mus. Bot.*

Ceylon, Ambagamwa district at 4000 feet elevation, also in Bengal.

14. Eugenia caryophyllæa, *Gærtn.*—A large shrub or sometimes a middling sized tree, glabrous, leaves obovate or spathulate or more rarely ovato-lanceolate, obtuse or with a very short acumination, somewhat coriaceous, inconspicuously dotted, cymes terminal corymbose trichotomous lax, flowers small, calyx turbinate inconspicuously repand or 4 toothed, petals cohering and falling off as a lid, fruit globose size of a pea. *Wight Icones. tab.* 540.

Very common in S. Canara, Malabar, &c., particularly near the banks of rivers, generally in the form of a large shrub only ; it is also common in Ceylon up to 3000 feet elevation, where it is called Dáng, the fruit is eaten.

15. Eugenia Gardneri, *Thw.*—A middling sized tree, leaves glabrous pale green, ovato-lanceolate rostrato-acuminate beneath delicately parallel veined, pellucidly punctate, $2\frac{1}{2}$-4 inches long by 1-$1\frac{1}{2}$ broad, petiole slender 4-5 lines long, cymes shorter than the leaves terminal and axillary, flowers small, calyx obscurely 4 toothed, petals cohering and falling off as a lid. *Thw. En. Pl. Zey. p.* 117.

Anamallays and Tinnevelly mountains up to 4000 feet, and in Ceylon 2000 4000 feet. (This much resembles E. toddalioides, *Wight,* and should be compared with that plant.)

16. Eugenia micrantha, *Thw.*—A middling sized tree, leaves glabrous ovate or elliptic obtusely rostrate-acuminate, venose, obscurely punctulate, narrowed at the base, 2-4 inches long (of which the point is $\frac{1}{2}$ to $\frac{3}{4}$ inch), $\frac{1}{2}$-2 inches broad, petiole 2-5 lines long, cymes about equalling the leaves, flowers small, calyx acutely 4-toothed, berry spherical reddish as large as a pea. *Thw. En. Pl. Zey. p.* 117.

Ceylon, central provinces, elevation 3000-5000 feet.

17. Eugenia rubicunda, *WA.*—A small tree or large shrub, glabrous, leaves narrow oblong attenuated at both ends obtuse at the very point, coriaceous pellucid-dotted striated with numerous parallel transverse veins, $2\frac{1}{2}$-3 inches long by about $\frac{1}{2}$ inch broad, petioles 2-4 lines long, cymes corymbose terminal longer than the leaves, flowers minute, calyx repand 4-lobed shortly turbinate. *WA. Prod. p.* 330 ;—*Wight Icones tab.* 538.

Tinnevelly district very common up to 3000 feet elevation.

18. Eugenia lissophylla, *Thw.*—A middling sized tree, leaves ovato lanceolate acuminate very smooth finely striated below with numerous parallel transverse veins, punctulate, $1\frac{1}{2}$-3 inches long by 6-13 lines broad, petioles 2-3 lines long, cymes generally longer than the leaf, calyx-teeth short rounded. *Thw. En. Pl. Zey. p.* 117.

Ceylon, central provinces 3000-5000 feet, perhaps not distinct from E. rubicunda.

19. Eugenia umbrosa, *Thw.*—A middling sized tree, very ramous, leaves ovate shortly and obtusely acuminate or retuse narrowed at the base, very smooth on both sides, almost veinless, 1-2 inches long by 6-10 lines broad, petiole $1\frac{1}{2}$-2 lines long, cymes longer than the leaf. *Thw. En. Pl. Zey. p.* 13.

Ceylon, open grassy places, central provinces 5000-6000 feet, similar to the last species in inflorescence but differing in the shape and venation of the leaves.

20. Eugenia spathulata, *Thw.*—A small tree, leaves spathulato-obovate or lanceolate obtuse, above shining below opaque, sparingly parallelo-venose, densely glanduloso-punctate, 1-$1\frac{3}{4}$ inches long by 4-8 lines broad, petiole 1-$1\frac{1}{2}$ lines long, cymes about as long as or shorter than the leaves, flowers small shortly pedicellate, fruit spherical, reddish black, size of a pea. *Thw. En. Pl. Zey. p.* 118.

Ceylon, central provinces, 3000-5000 feet elevation.

21. Eugenia sclerophylla, *Thw.*—A middling sized tree, leaves glabrous very coriaceous obovate or rotundate sessile cordate, venose beneath, costa thickened at the base, $\frac{1}{2}$ to 1 inch long by 4-10 lines broad, cymes about equalling the leaves, berry spherical blackish as large as a small cherry. *Thw. En. Pl. Zey. p.* 118.

Ceylon, central provinces 6000-7000 feet, nearly allied to Eugenia rotundifolia.

22. Eugenia oligantha, *Thw.*—A small tree, leaves obovate retuse or shortly pointed narrowed at the base, punctate, obscurely venose, 4 lines to 1 inch long by 3-8 lines broad, petiole 1 line long, capitula few flowered, shortly pedunculate terminal, fruit spherical reddish black, size of a pea. *Thw. En. Pl. Zey. p.* 118.

Ceylon, Ambagamwa district, 3000-5000 feet elevation.

23. Eugenia rotundifolia, *Arnt.*—A small tree or large shrub, leaves orbicular very obtuse or obscurely pointed subcordate at the base or a little narrowed, coriaceous, scarcely punctate, above glossy, veinless beneath, penniveined, 4-8 lines long, petiole $\frac{1}{2}$ to $1\frac{1}{2}$ lines long, cymes terminal sessile capituliform few flowered, calyx obovate shortly toothed, fruit spherical reddish-black, size of a small cherry. *Arnt.* ;—*Wight. Ill. p.* 17.

Ceylon, Ambagamwa district, 3000-5000 feet elevation.

24. Eugenia salicifolia, *Graham.*—A small tree or large shrub, leaves glabrous linear lanceolate tapering at both ends obtusely acuminate, transversely finely parallel veined, pellucid dotted, 4-5 inches long by ¾ inch broad, cymes numerous lax trichotomous from the scars of the fallen leaves (as in E. jambolana), flowers small white. *Graham Cat. of Bombay Plants ;—Dalz. Bombay Flora p.* 94 ;—*Wight Ill.* ii. *p.* 16, *and Icones tab.* 532.

Bombay ghats, banks of streams at the higher elevations ; called Panjambool; Jubbulpore bed of the Nerbuddah ; the wood is much used for rafters.

SECTION ACMENA.—*Characters the same as Syzygium, only the calyx tube is elongated and tapers at the base, and the flowers are more showy.*

25. Eugenia Zeylanica, *Wight.*—For description, &c. see Pl. ccii.

26. Eugenia lanceolata, *Wight.*—A small tree, leaves glabrous elliptic oblong slightly tapering at both ends, thinly coriaceous inconspicuously dotted marked beneath with the transverse veins, 3-5 inches long by about 1½ broad, peduncles 4 angled terminal axillary or from the former year's axils, flowers numerous and arranged in umbels on the partial lateral pedicels, or few about 3 together at the apex and 2-3 at the sides of each peduncle, calyx glabrous (sometimes glaucous) elongate obovate repandly 4-5 toothed, petals falling off as a lid or occasionally the outer ones expanding. *Wight. Ill.* ii. *p.* 15, *& Icones tab.* 530. Eugenia (Acmena) Wightiana, *Wight. Ill. p.* 15, *& Icones tab.* 529.

A very showy tree when in full blossom. I have specimens from all parts of our Western ghats and Ceylon ; they differ much in the length of the calyx-tube and number of flowers.

SECTION JAMBOSA.—*Flowers in terminal or axillary short panicles or cymes or rarely on short axillary* 1 *flowered peduncles* (*E. Wightii*), *calyx tube turbinate usually elongate and tapering at the base or hemispherical* (*Strongylocalyx*), *more or less produced above the ovary, prominently lobed, the lobes usually persistent, glabrous trees.*

Strongylocalyx, Bl., belongs to this section, and only differs in having a rounded instead of a cylindric calyx-tube (*unde nomen*) *and is not generally admitted even as a distinct section from Jambosa.*

27. Eugenia cylindrica, *Wight.*—For description, &c. see Pl. cci.

28. Eugenia Wightii, *Bedd.*—A middling sized very graceful tree, glabrous, leaves submembranaceous lanceolate attenuated at the base and ending in a longish blunt acumen, 4-5 inches long by about 1½ inch broad, punctate, veins inconspicuous above more prominent beneath with large single connecting loops at some distance from the margin, petioles 2-3 lines long, peduncles axillary or from the old axils solitary 1 flowered, ½ to 1¼ inches long, flowers very large 2 to 3 inches in full expansion generally crimson but white in one variety, calyx tube cylindrical very long and slender and generally attenuated into a pedicel, limb 4 cleft, lobes rounded.—Eugenia pauciflora, *Wight Icones tab.* 526—(not *DC. Prod.* iii. *p.* 269.)

A very elegant tree common in all our moist Western ghat forests from Canara downwards, it is very distinct from Eugenia cylindrica, the peduncles are always only 1 flowered, the calyx tube much more slender and the flowers much larger, the leaves much more membranaceous, and the veins only forming single loops, not double as in cylindrica.

29. Eugenia Munronii, *Wight.*—A middling sized tree glabrous, leaves very coriaceous more or less cordate at the base, from linear-lanceolate to broad-lanceolate ending in a blunt acumen 6-9 inches long by ¾-3 broad, punctate, veins very prominent beneath and meeting within the margin and forming a thick coarse nerve waved or sometimes very regular and straight, petioles 1-2 lines long, cymes terminal, flowers white very large, calyx tube much attenuated at the base, lobes somewhat membranaceous. *Wight Icones tab.* 546.

A very beautiful tree common in our moist Western ghat forests from Canara down to Cape Comorin. Wight's figure is good, but the leaves are often very much narrower.

30. Eugenia aquea, *Rumph.*—A middling sized tree, glabrous, leaves from oval to oblong or lanceolate, almost sessile more or less cordate at the base, very coriaceous, black-dotted, 1½-2¼ inches long by 1-1½ broad, veins a little prominent beneath (when dry) forming inconspicuous loops near the margin, petioles about 1 line long, peduncles terminal or from the upper axils 3-many flowered, flowers rather large white or red, calyx tube cylindric and slightly turbinate upwards about 1 inch long, lobes 4 subreniform, petals subrotundate small. *Roxb. Fl. Ind.* ii. 492 ;—*Wight Icones* 216 *and* 550 ?

Anamallay mountains, banks of rivers 6000 feet elevation, Ceylon central provinces up to 5000 feet very common, called Wal-jamboo. A very handsome tree ; both my Ceylon and Anamallay speciments have the leaves exactly oval and not more than 2¼ inches long, the Anamallay specimens have slightly smaller and more numerous flowers, and the calyx tube is very gradually broader upwards and not at all contracted near the apex as it is in those from Ceylon ; the Anamallay tree has the young ramuli acutely 4-angled, and they appear nearly quite terete in the Ceylon plant, and in the former the veins run exactly at right angles with the midrib, though in the Ceylon plant they are oblique ; the two however cannot be different species. Wight's figures 216 and 550 (the latter copied from Roxburgh) give no idea of our tree, the calyx tube is much shorter and broader, and the leaves very much larger.

31. Eugenia hemisphærica, *Wight.*—For description, &c. see Pl. cciii.

This is the Strongylocalyx hemisphærica of Blume ; it differs very much in the size of its flowers, and I believe Eugenia lanceolaria, *Roxb.*, to be the same plant, at least unless I have confounded the 2 species. Some of my specimens quite agree with Roxburgh's figure of lanceolaria.

To this section Jambosa, belong Eugenia caryophyllata (the Clove), Eugenia jambos (the rose-apple), Eugenia Malaccensis and Eugenia alba, handsome trees of Asiatic origin introduced into gardens in S. India, but not indigenous in the presidency.

SECTION EU-EUGENIA.—*Peduncles generally solitary or several together 1-flowered rarely forming short few flowered racemes; calyx tube not at all or scarcely produced above the ovary, lobes generally prominent and persistent, petals free and spreading, flowers (much like the myrtle) more conspicuous than in Syzygium, less so than in Jambosa, young parts and inflorescence generally more or less floccose or silky.*

32. Eugenia floccosa, *Bedd.*—For description, &c. see Pl. cc.

33. Eugenia bracteata, *Roxb.*—A shrub or rarely a small tree, young shoots, petioles, peduncles and calyx clothed with a rusty pubescence, leaves ovate-oblong tapering or cuneate at the base obtuse or with a short blunt acumination, at first slightly downy at length quite glabrous and shining above, pellucid-dotted, peduncles usually axillary or sometimes terminal short 1-flowered longer than the petioles 1-4 together with 2 small bracteoles under the calyx, calyx-segments 4 unequal linear-oblong obtuse ciliate, petals 4, style slender, fruit globose 1-2 seeded. *Roxb. Fl. Ind.* ii. *p.* 290;—*WA. Prod. p.* 331. E. Roxburghii, *DC.* iii. 271.

A shrub or small tree very common in the plains of S. India and Ceylon, particularly so on the seacoast, where it is only a shrub; in subalpine jungles it grows to be a small tree, and I have specimens from the Anamallays 5000 feet elevation.

34. Eugenia Willdenovii, *DC.*—A small tree or large shrub, the young shoots, young leaves, and inflorescence pubescent, leaves lanceolate at length glabrous or subglabrous obtusely pointed not dotted coriaceous, veins not prominent joined into a waved continuous one near the margin, $1\frac{1}{2}$ to 2 inches long by $\frac{1}{2}$-$\frac{3}{4}$ inch broad, petioles 2-4 lines long, peduncles filiform 1 flowered $\frac{3}{4}$ to 1 inch long solitary or in pairs in the axils or on the leafless branchlets, with 2 short subulate bracteoles under the calyx. *Wight Icones tab.* 545. (Not characteristic, and the peduncles are represented as 2 flowered, which they never are).—E. Zeylanica, *WA. Prod. p.* 331.

Very common in the plains of S. India and Ceylon, called Tambaleya in the latter island; wood strong and in use but of small size.

35. Eugenia Rottleriana, *WA.*—A small tree or shrub, much branched, young shoots, petioles and inflorescence covered with rust colored tomentum, leaves from lanceolate to linear lanceolate tapering at both ends obtuse at the point at length glabrous, pellucid-dotted 1-2 inches long by $\frac{1}{4}$ to $\frac{1}{2}$ inch broad, petioles 1-3 lines long, peduncles axillary solitary or several together or on small lateral shoots, filiform 1 flowered, $\frac{1}{4}$-$\frac{3}{4}$ inch long, bracteoles 2 under the calyx, calyx lobes 4 triangular ovate obtuse, petals much longer than the calyx. *WA. Prod p.* 331;—*Wight Icones tab.* 100 (*bad.*)

Tinnevelly ghats up to 4000 feet, a very pretty little tree. There are two distinct forms, one with the leaves 1-$1\frac{1}{2}$ inches long and $\frac{1}{2}$ inch broad, the other with them about 2 inches long and only $\frac{1}{4}$ inch wide; the former variety comes very near to Willdenovii.

36. Eugenia microphylla, *Bedd.*—A small tree, much branched and very dense, glabrous in all its parts, young branches angled and winged, leaves opposite occasionally alternate or subalternate thickly coriaceous linear obtuse, 4-6 lines long by 2-3 lines broad, when young bright red and quite glabrous, veins quite inconspicuous prominently black dotted, petioles 1 line long, peduncles axillary solitary shorter than the leaves 1 flowered, fruit the size of a large grain of pepper.

A most beautiful little tree, Muti-kuli-vayal, a valley on the Asamboo hills (Travancore), 4500 feet elevation, banks of a river abundant in fruit in August. I unfortunately could not procure it in flower.

37. Eugenia Mooniana, *Wight.*—A shrub or small tree, young shoots puberulous, leaves pellucid dotted, short petioled ovate tapering at the base acuminate, acumen either short and blunt or prolonged and tapering to a fine point, peduncles axillary solitary or in pairs 1 flowered, flowers small, calyx tube ventricose oblong, limb 4 cleft, segments reflexed pointed, fruit globose size of a cherry. *Wight. Icones tab.* 551.

Western ghats of the Madras Presidency from Canara downwards and in Ceylon up to 4000 feet. E. gracilis, *Bedd. Linn. Trans. vol.* xxv., is I believe only a form of this, although it has oblong instead of globose fruit. I have another species nearly allied to this, which I think will prove new, but my specimens are not very perfect, it has the peduncles several flowered.

38. Eugenia Wynadensis, *Bedd.*—A small tree or shrub, young leaves ramuli and inflorescence densely fulvo-tomentose, leaves oblong lanceolate with a long blunt acumination, when old quite glabrous on both sides, 3-$3\frac{1}{2}$ inches long by 1-$1\frac{1}{4}$ broad, petioles 3-4 lines long, peduncles supra-axillary 6 lines long, calycine lobes 4 lanceolate acuminate a little longer than the corol, bracts 2 linear much longer than the sepals, stamens inserted round the edge of the disk, ovary 2-celled, ovules pendulous from the apex, about 4 in each cell. *Bedd. Mad. Lit. Soc. Journ.*

Common about Devallicottah in the Wynad, elevation 2000-3000 feet.

39. Eugenia argentea, *Bedd.*—A small tree or shrub. Stems, petioles, peduncles and under surface of the leaves densely silvery-pubescent, leaves ovato-elliptic to lanceolate rounded at the base, terminating in a longish fine acumination at the apex not dotted, 4-$5\frac{1}{2}$ inches long by $1\frac{1}{4}$-$1\frac{1}{2}$ broad, veins rather prominent beneath running into a regular looped vein near the margin, peduncles 1 inch long filiform from the old axils or axillary furnished with a long filiform bract at the base, flowers 4-5 lines across in expansion furnished at the base with 2 long filiform bracteoles double the length of the calyx lobes.

In the Wynad 3000 feet elevation, a rare tree.

40. Eugenia Calcadensis, *Bedd.*—A small tree, young shoots, young leaves and inflorescence covered with dense rusty pubescence, leaves sometimes subalternate coriaceous not dotted, elliptic to subobovate obtuse at the apex, very rugose on the upper

side but glabrous in age except the channelled costa, venation quite inconspicuous above, slightly prominent beneath the primary veins joined into a marginal one, 2½-3 inches long by 1-1¼ broad, petioles 3-4 lines long, peduncles axillary solitary about as long or a little longer than the petiole, 2-flowered at the apex rarely only 1 flowered, pedicels, 1-1¼ inches long furnished with a subulate bract at the base of each and 2 at the apex below the calyx, flowers showy white, 1-1¼ inches in diameter, calyx lobes rounded about 3 lines long, petals oblong ciliate 6-8 lines long, disk suborbicular woolly covering the top of the ovary, stamens inserted all over it.

A very beautiful little tree only observed on the Calcad hills, South Tinnevelly, elevation 2000 feet.

41. Eugenia terpnophylla, *Thw.*—A middling sized tree, branchlets terete, young branches, young leaves and inflorescence ferrugineo-pilose, leaves membranaceous lanceolate or oblongo-lanceolate with a long acumination more or less attenuated at the base, 2½-5 inches long by ½-2 inches broad, primary veins 5-8 prominent beneath, looped, marginal veins double, the inner one most prominent, petiole ¼-½ inch long, peduncles axillary and terminal short few flowered, pedicels equalling the petiole, petals white twice as long as the rounded lobes of the calyx, fruit spherical puberulous as large as a small cherry generally 1 seeded. *Thw. En. Pl. Zey. p.* 114.

Ceylon, Ambagamwa and Ratnapoora and Reigan Corle at no great elevation.

42. Eugenia rufo-fulva, *Thw.*—A tree 30-40 feet high, young parts short rufo-or fulvo-pilose, leaves lanceolate with a long sharp acumination glabrous and shining above (except whilst young) channelled on the costa beneath shortly clothed with adpressed rufous or fulvous tomentum, at length subglabrous, primary veins joined near the margin in a waved continuous one, 4-5 inches long 1-1½ inches broad, petiole ½ an inch long, peduncles axillary short 1-3 flowered, pedicels longer than the petiole, calyx with small subulate bracteoles. *Thw. En. Pl. Zey. p.* 416.

Ceylon, Gattehatte near Avishanelle.

43. Eugenia xanthocarpa, *Thw.*—A low tree, young parts and inflorescence ferrugineo-pilose, leaves elliptic lanceolate obtusely acuminate glabrous acute at the base channelled above at the costa, the primary veins numerous and joined near the margin into a continuous vein ; 2½-4 inches long 1-1½ inches broad, petiole 3 lines long, peduncles axillary several flowered, pedicels about equal to the petioles, fruit 1-4 seeded subspherical, ferrugineo-pilose and minutely glanduloso verrucose, 3-6 lines in diameter yellowish. *Thw. En. Pl. Zey. p.* 416.

Ceylon, between Galle and Colombo near the sea coast.

44. Eugenia amæna, *Thw.*—A small tree, ramuli terete, leaves sessile cordate or ovato-lanceolate acuminate glabrous reticulate beneath, 2-6 inches long by 1¼-2¼ inches broad, flowers generally terminal subfasciculate, pedicels 7-10 lines long rarely shorter, petals 4 white oblong about 3 lines long longer than the rounded lobes of the calyx. *Thw. En. Pl. Zey. p.* 114.

Ceylon, Kokool Corle, and Dolosbage district up to an elevation of 1500 feet.

45. Eugenia mabeoides, *Wight.*—A rigid shrub, quite glabrous in all its parts, very ramous, leaves short petioled obovate-spathulate glabrous rigid shining above densely glanduloso-punctate, ½-2 inches long by ¼-1¼ broad, pedicels very short fascicled on short subaxillary tubercles, calyx-tube ventricose, limb 4-parted, fruit spherical as large as a small cherry. *Wight Ill.* ii. *p.* 13 ;—*Thw. En. Pl. Zey. p.* 114.

Ceylon, central provinces, at 4000-7000 feet elevation.

46. Eugenia floccifera, *Thw.*—A small tree, young parts and inflorescence densely fulvo-tomentose, branches terete, leaves oblongo-lanceolate with a very long gradual acumination, at length glabrous, 4-8 inches long by 1-2 inches broad, primary veins rather prominent beneath joined in a marginal loop-vein, petiole 3-4 lines long, pedicels axillary short fascicled, calyx-lobes 4 lanceolate much longer than the tube, equalling the petals, petals white 4 lines long. *Thw. En. Pl. Zey. p.* 115.

Ceylon, Reigam Corle at no great elevation.

47. Eugenia fulva, *Thw.*—A small tree, branches terete, young parts and inflorescence fulvo-tomentose, leaves elliptic or oblong abruptly and shortly acuminate rounded at the base, venose beneath, 4-6 inches long by 2¼-3 inches broad, petiole 4 lines long, flowers axillary and cauline small sessile crowded. *Thw. En. Pl. Zey. p.* 115.

Ceylon, Pasdoon Corle, at no great elevation.

48. Eugenia rivulorum, *Thw.*—A small tree, branchlets terete, leaves lanceolate acuminate narrowed at the base, below, minutely fulvo-pilose, at length glabrous, 10-14 inches long 3-4½ inches broad, petiole about ½ inch long, flowers large sessile axillary and cauline, calyx pilose on the outside, lobes 4 rounded as long as the tube, petals oblong pale purple 5 lines long. *Thw. En. Pl. Zey. p.* 115.

Ceylon, banks of streams, Singhe Rajah forest between Galle and Ratnapoora, at no great elevation.

49. Eugenia insignis, *Thw.*—A low ramous tree, young parts villous with fugaceous white down, leaves glabrous oblong acuminate, slightly acute at the base smooth above, channelled at the costa, paler beneath, (primary veins about 12 on each side prominent looped at the margin in a continuous vein, areoles smooth almost veinless,) 6-8 inches long by 2-3½ inches broad, petioles 6-8 lines long, flowers axillary and on the branches few sessile small, calyx albo-villous on the outside, segments oblong 2 lines long, petals a little longer ciliate, fruit spherical albo-villous or floccose. *Thw. En. Pl. Zey. p.* 416.

Ceylon, Galpara in the Reigam Corle.

50. EUGENIA DECORA, *Thw.*—A small tree, branches terete, leaves oblong acuminate rounded at the base glabrous shining above, beneath paler and minutely reticulate, 4-5 inches long by about 2 inches wide, petiole 4 lines long, flowers white sessile crowded axillary and cauline, fruit transversely oblong reddish black 6 lines long by 8 lines wide, 2-seeded. *Thw. En. Pl. Zey. p.* 115.

Ceylon, near Galle at no great elevation.

51. EUGENIA CONCINNA, *Thw.*—A tree, branchlets terete, young parts pilose, leaves firm very slightly pilose at length glabrous ovate rather abruptly acuminate obtuse a little acute at the base, primary veins 12-16 on each side with a marginal connecting vein, areoles obscurely venoso-reticulate, 3-5 inches long by $1\frac{1}{2}$-$2\frac{1}{2}$ inches broad, petiole 2-3 lines long, pedicels axillary fasciculate twice as long as the petiole, flowers small, fruit spherical glabrous shining red 6 lines in diameter. *Thw. En. Pl. Zey. p.* 416.

Ceylon, Ambagamwa district.

52. EUGENIA CUNEATA, *Heyne.*—A small tree or shrub, leaves short petioled obovato-spathulate, glabrous on both sides, peduncles axillary solitary or congested sometimes from the abortion of the leaves, corymbose on the ends of the branches 1-flowered, tube of the calyx globose clothed with soft white tomentum, limb 4-lobed persistent, fruit the size of a sloe. *Heyne in Herb. Wall.* 3625. Jossinia Indica, *Wight Icones tab.* 523 ;—*Bl. Mus. Bot.* 1. *p.* 122.

Sevagherry hills (Tinnevelly district).

53. EUGENIA CODYENSIS, *Munro.*—Shrubby glabrous, leaves short petioled from ovate oblong to obovate with a short blunt acumen tapering towards the base, pellucid-dotted, flowers subsessile aggregated forming terminal capituli on the points of short abortive branches, or they are axillary solitary or a few together, calyx tube small clothed with silky tomentum somewhat globose, limb persistent, lobes ciliate, petals twice the length of the calyx, lobes ciliate, style and stigma simple, fruit globose 1-2 seeded. *Wight Ill.* ii. *p.* 13.

Coorg, near Mercara, flowers sweet scented. I have never found these last 2 species.

I have in my Herbarium several undescribed species of the Syzygium section, but my specimens are not perfect enough for description ; further search will undoubtedly add some new species from the higher ranges of the Palghat hills, Anamallays, Tinnevelly, Travancore, &c. From Ceylon I have an undescribed species from Dr. Thwaites, labelled Eugenia hypoleuca.

I have figured 7 species, exhibiting the most marked forms of this large genus ; space will not allow of more figures as it is proposed to complete the work in 25 numbers.

BARRINGTONIA. FORST.

For Gen. Char. see letter-press to Pl. cciv.

1. BARRINGTONIA ACUTANGULA, *Gærtn.*—For description, &c. see Pl. cciv.

2. BARRINGTONIA RACEMOSA, *Roxb.*—A good sized tree, leaves cuneate-oblong acuminated serrulate or crenulated, 3-12 inches long by 1-4 broad, flowers large pale pink forming a long pendulous raceme, pedicels scarcely so long as the flower 1-bracteated at the base, calyx at length 2-3 cleft, ovary 2-celled, ovules attached to the middle of the dissepiments, fruit ovate size of an egg bluntly 4-angled. *Roxb. Fl. Ind.* ii. 634 ;—*WA. Prod. p.* 333 ;—*Rheede. Mal.* 4. *t.* 6 ;—*Wight Icones t.* 152.

Malabar, Travancore about the backwaters, and Ceylon, in the latter place it is called Deya-midella, it is a very beautiful tree when in blossom, the bark and root are used medicinally by the natives, the timer is lighter in color than that of B. acutangula, closer grained and of less specific gravity and nearly as strong, it works well and gives a good even surface, unseasoned it weighs 60-65 lbs. the cubic foot, and seasoned 53 lbs., and its specific gravity is ·848, it is used for house building, cart-framing, &c.

3. BARRINGTONIA SPECIOSA, *Linn.*—A large handsome tree, leaves sessile obovate entire attaining more than 1 foot in length, flowers very large in short terminal racemes, the rachis thick, the pedicels 1-2 inches long, calyx deeply divided into 2-3 oval oblong concave almost leaf-like segments above 1 line long, petals from half as long again to twice as long as the calyx-segments, stamens very numerous red 2-4 inches long, ovary imperfectly 4-celled with about 6 ovules in each cell, fruit large pyramidal 4 angled crowned by the persistent calyx-lobes. *Wight. Icones. tab.* 547 ;—*Benth. Fl. Aust.* iii. *p.* 288.

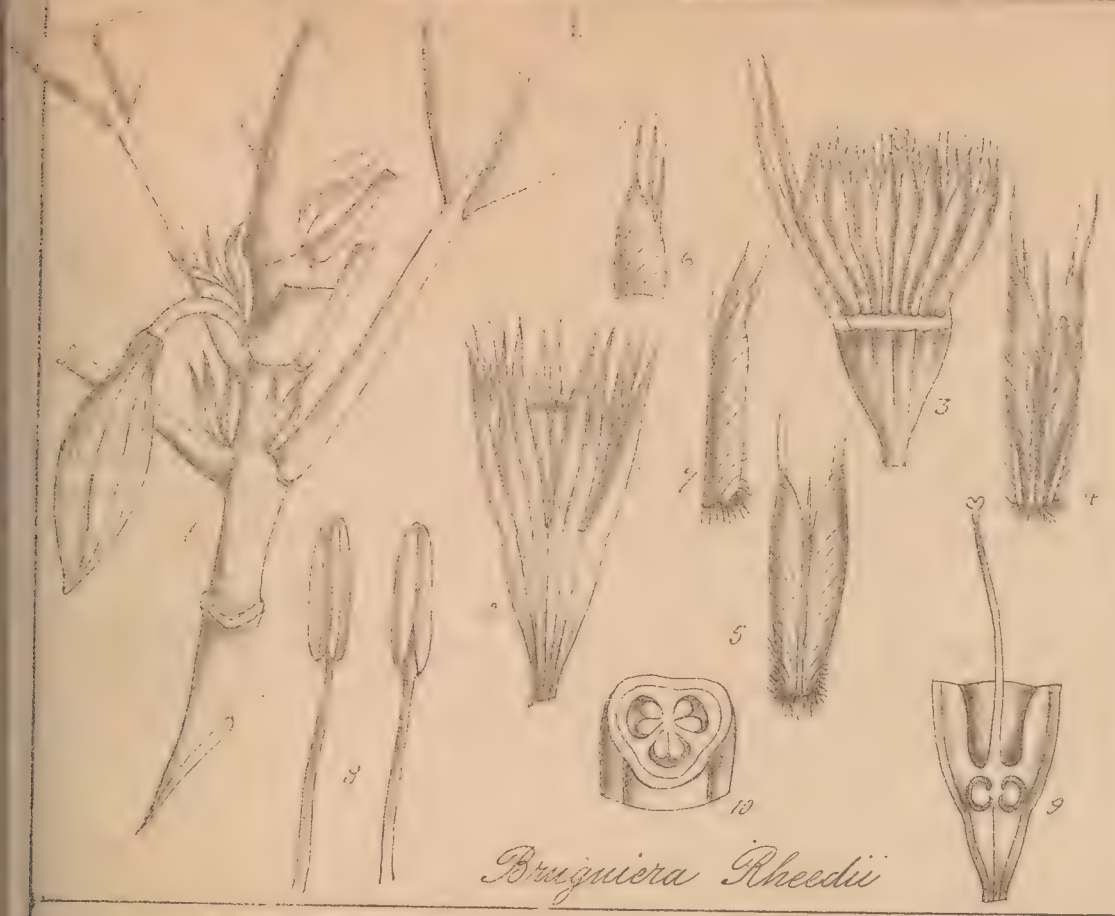
Ceylon, common on the sea-shore between Galle and Matura, has been introduced into gardens in S. India, but is not I believe found in a wild state ; it is indigenous in the Archipelago, and the Pacific Islands and Australia (Queensland).

CAREYA. ROXB.

For Gen. Char. see letter-press to Pl. ccv.

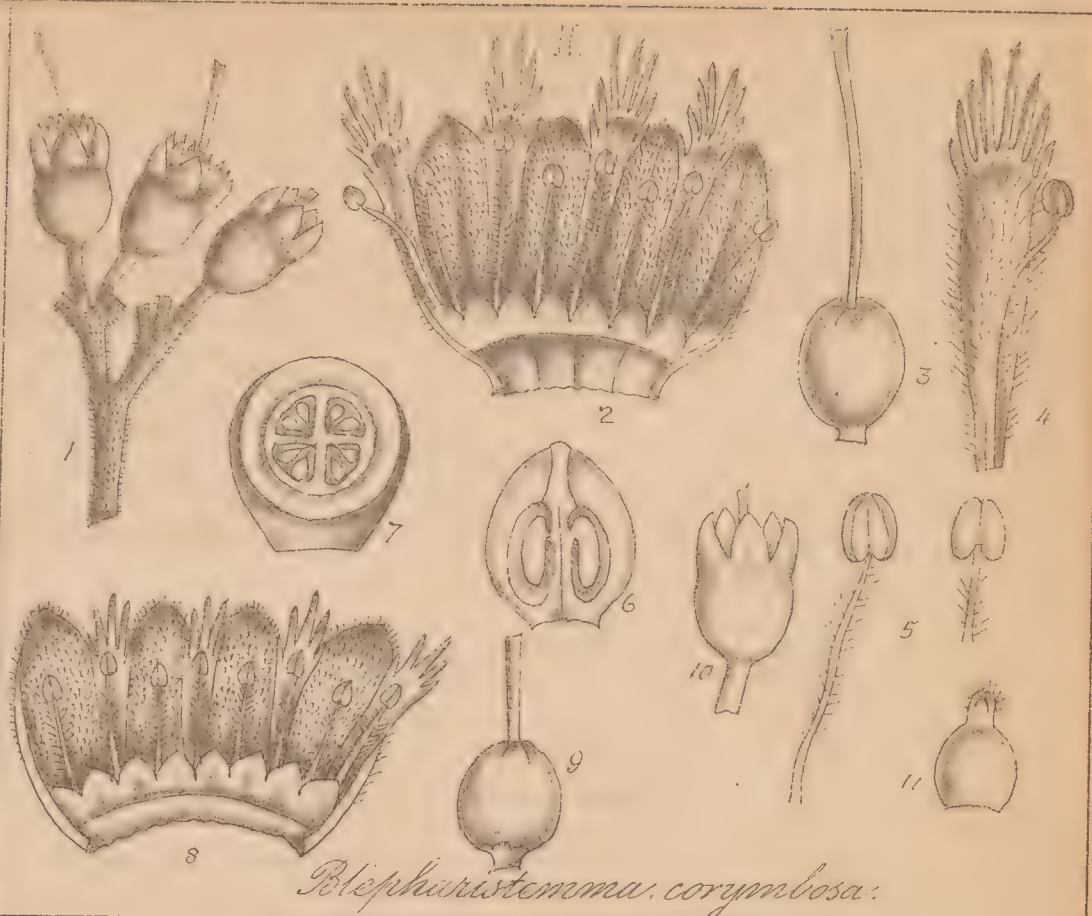
1. CAREYA ARBOREA, *Roxb.*—For description, &c. see Pl. ccv.

I



Bruguiera Rheedii

II



Blephuristemma corymbosa.

III

Rhodomyrtus tomentosa.

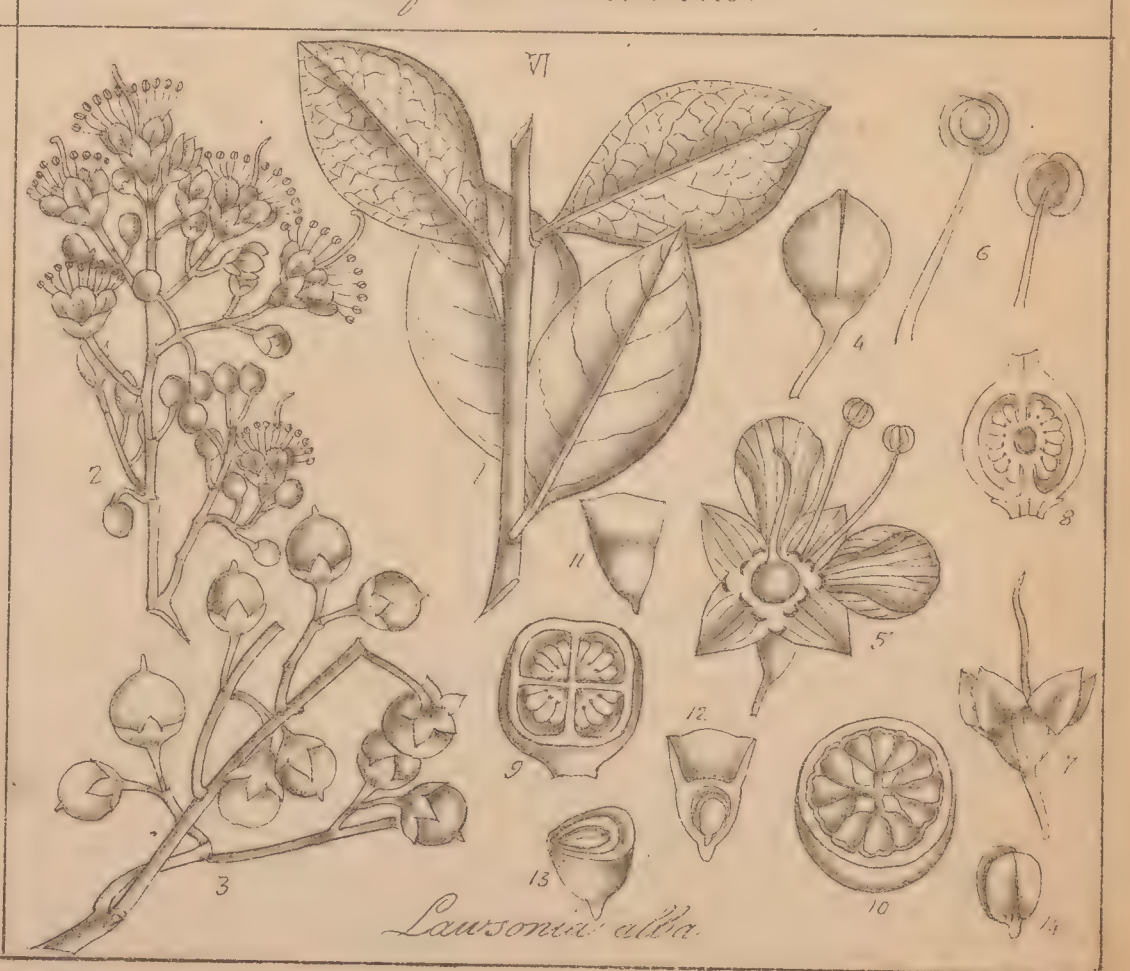
IV

Woodfordia tomentosa.

V

Semecarpus acidula.

VI



Lawsonia alba.

ORDER XXXIX—MELASTOMACEÆ.

Calyx-tube enclosing the ovary, and either cohering with its angles, leaving intermediate cavities, or entirely free or more or less adnate to it, the limb entire or with 3 to 5 or rarely 6 lobes, or teeth, usually imbricate in the bud. Petals as many as calyx-lobes, inserted at the orifice of the calyx-tube, imbricate (usually contorted) in the bud. Stamens usually twice as many, sometimes only as many as petals and inserted with them, the filaments curved down in the bud ; anthers 2-celled, opening in 1 or 2 pores at the top or very rarely in longitudinal slits, and before flowering their tips are usually contained in the cavities between the ovary and calyx, the connective often variously extended or thickened. Ovary enclosed in the calyx-tube and adnate to it, or more or less free, with 2 to 6 or rarely more cells, with the placenta in the axis, or rarely 1-celled, by the abortion of the partitions. Style simple, with a minute or capitate or peltate stigma. Ovules several rarely 2 only to each placenta, anatropous. Fruit enclosed in the calyx or combined with it, either succulent and indehiscent, or bursting irregularly, or capsular and opening in as many valves as there are cells. Seeds usually numerous and small, straight or *cochleate* (i. e., curved somewhat like an univalve shell), without albumen ; testa coriaceous, crustaceous or membranous. Embryo straight or curved ; cotyledons plano-convex or thick and variously folded ; radicle short. Herbs, shrubs or rarely trees. Leaves opposite, simple, petiolate, 3 to 11 nerved, or in *Memecyleæ* 1 nerved and penniveined, entire or rarely serrulate. Stipules none. Flowers usually in terminal panicles or clusters, rarely axillary or solitary.

SUB-ORDER I. MELASTOMEÆ.—Ovary 2-6 celled with the placenta in the axis, fruit many seeded, seed minute ; embryo small terete or subglobose.

This suborder is largely represented in S. India by very beautiful herbs, under-shrubs and parasitic plants belonging to the genera Melastoma, Osbeckia, Sonerila, Medinella and Kendrickia, but it does not yield any trees or large shrubs.

SUB-ORDER II. MEMECYLEÆ.—Ovary 1-celled with a central placenta, fruit 1-5 seeded, embryo large, cotyledons plano-convex or subfoliaceous.

This suborder is only represented by one genus, Memecylon ; the species are numerous, particularly in Ceylon ; they are generally small trees but often only shrubs.

MEMECYLON. LINN.

For Gen. Char. see letter-press to Pl. ccvi.

1. MEMECYLON CAPITELLATUM, *Linn.*—A small tree or large shrub, branches terete or subterete, leaves elliptic oblong, narrowed at both ends and rather obtusely pointed at the apex 1½-4 inches long by ⅔rd to 1¾ inches broad, (petioles 1-2 lines long) sub 3-nerved from the base the 2 lateral nerves forming a looped vein not far from the margin into which the rather prominent primary veins run, peduncles axillary 3 lines to 1 inch long, flowers 3-6 capitate sessile or subsessile, the disk of the calyx radiately 8 winged, berry succulent very shortly pedicellate, globose smooth prominently crowned with the limb of the calyx. *Linn. Spec. Pl. p.* 497.

Ceylon, not uncommon up to an elevation of 1000 feet. Tinnevelly and Travancore ghats up to 2000 feet, the Peninsula plant, which is a small tree, is figured at Pl. ccvi. with M. umbellatum, it only differs from the Ceylon form in having much shorter peduncles ; the tree is called Welli-kaha in Ceylon.

2. MEMECYLON EDULE, *Roxb.*—A small tree or large shrub, branches terete, leaves oval to elliptic or rarely obovate, obtusely pointed, 2-6½ inches long by 1-3½ broad, shining firm, and the penninerved venation very obscure, petioles 2-4 lines long, peduncles 3-4 times longer than the petioles, compound, generally from scabrous elevations at the old axils below the leaves but sometimes axillary, pedicels colored equalling the calyx, disk of the calyx radiately winged, berry succulent very shortly pedicellate globose smooth, crowned by the limb of the calyx. *Roxb. Fl. Ind.* ii. 260. Memecylon Royenii, *Bl. Mus. Bot.* ii. 360. M. Heyneanum, *Wight Icones tab.* 278.

This small tree or shrub is very common in the jungles on the eastern side of this presidency and in Ceylon ; the dark blue colored fruit is eaten by the natives, it is called Alli in Teligu, and Anjun and Kurpá on the Bombay ghats ; the wood is strong and serviceable.

3. MEMECYLON SYLVATICUM, *Thw.*—A small tree, branches terete, leaves ovate or elliptic, rather abruptly acuminate subsessile or narrowed at the base into a very short petiole, coriaceous, very obscurely penniveined, 1½ to 5½ inches long by ¾-2½ inches broad, peduncles short more or less compound, pedicels very short and thick, flower bluish-purple, disk of the calyx radiately 8 winged, berry spherical dark purple succulent 4-5 lines in diameter. *Thw. En. Pl. Zey. p.* 110.

Ceylon, common in forests 2000-4000 feet elevation, nearly allied to *edule* but differing in its more abruptly acuminated leaves, shorter petioles and peduncles and somewhat larger flowers.

4. MEMECYLON LEUCANTHUM, *Thw.*—A small tree, branches obscurely 4 angled, leaves rather shining roundish to ovate or elliptic, acute at the base, abruptly acuminated with a short obtuse point, 1½-2½ inches long by ¾-1½ inches long, (petiole 1 line long) penniveined with the primary veins rather prominent, peduncles rather elongated, flowers white lax, calyx-disk radiately 8 winged, petals reflexed, pedicels twice as long as the calyx, berry spherical. *Thw. En. Pl. Zey. p.* 110.

Ceylon, central provinces 3000-5000 feet elevation.

5. MEMECYLON RHINOPHYLLUM, *Thw.*—A small tree, branches obscurely 4 angled, leaves opaque veinless ovate or elliptic much acuminated at the apex, acute at the base, subsessile, 2-3 inches long (of which the acumen is ½ an inch) ¾-1½ inches broad, pe-

duncles corymbose or umbellato-corymbose, compact many flowered, flowers small pale blue, pedicels slender nearly twice as long as the calyx, disk of the calyx radiately 8 winged, berry spherical dark purple 3 lines in diameter. *Thw. En. Pl. Zey. p.* 110.

Ceylon, central provinces up to 3000 feet elevation.

6. MEMECYLON MACROCARPUM, *Thw.*—A small tree, branches terete, leaves very coriaceous rotundate obtuse more or less narrowed at the base, 3-4 inches long by $2\frac{1}{2}$-$3\frac{1}{2}$ inches broad, petioles 2 lines long, peduncles short, pedicels about equalling the calyx, disk of the calyx radiately 8 winged, berry large, 8 lines in diameter (immature) spherical. *Thw. En. Pl. Zey. p.* 110.

Ceylon, Ambagamwa at an elevation of 3000 feet.

7. MEMECYLON UMBELLATUM, *Burm.*—For description, &c. see Pl. cevi.

8. MEMECYLON REVOLUTUM, *Thw.*—A small tree, leaves coriaceous, oblongo rotundate obtuse subcordate, revolute at the margins, 2-3 inches long by nearly as broad, primary veins a little prominent, petiole 1 line long, peduncles many flowered more or less elongated and branched, pedicels one half longer than the calyx, flowers small, calyx-disk plane, petals white, berry dark-purple 4-5 lines in diameter. *Thw. En. Pl. Zey. p.* 111.

Ceylon, Rambodde at an elevation of 5000 feet.

9. MEMECYLON RUBRO-CÆRULEUM, *Thw.*—A tree 30 feet high, leaves veinless cuneato-ovate a little narrowed towards the apex retuse, paler beneath, $1\frac{1}{2}$-2 inches long by $\frac{1}{2}$-1 inch broad, (the young ones reddish) petioles 3 lines long, peduncles solitary or twin bearing a compound umbel of the same length, pedicels a half longer than the calyx, calyx reddish obscurely 4 toothed, disk plane, petals blue with a pale margin. *Thw. En. Pl. Zey. p.* 415.

Ceylon, Matella east.

10. MEMECYLON ANGUSTIFOLIUM, *Wight.*—A shrub 6-8 feet, young branches 4 angled, leaves veinless or sub-veinless dark green and shining above, pale beneath, channelled at the costa, linear lanceolate attenuated upwards into a very blunt point, about $2\frac{1}{2}$ inches long by 4-6 lines broad, petiole 1 line long, peduncles axillary or from the old axils below the leaves from scarcely 1 line to 4 lines long, thick with a tubercled dilated apex, pedicels slender 1-3 lines long numerous, calyx-disk plane, petals blue, berry dry or nearly so, dark purple smaller than a pea. *Wight's Icones. tab.* 276.

Tinnevelly ghats banks of rivers. Ceylon, common on banks of rivers up to 2000 feet, perhaps only a narrow leaved form of the variable Memecylon umbellatum.

11. MEMECYLON ROSTRATUM, *Thw.*—A small tree, leaves elliptic abruptly rostrato acuminate with the point obtuse, acute at the base, $1\frac{1}{2}$-$2\frac{1}{2}$ inches long (of which the acumen is $\frac{1}{2}$ inch) by $\frac{1}{2}$-$1\frac{1}{4}$ inches broad, inconspicuously venose, petiole $1\frac{1}{2}$ lines long, peduncles short or almost obsolete many flowered, pedicels 2-3 times longer than the calyx, flowers small, calyx-disk plane, petals white, anthers blue, berry spherical. *Thw. En. Pl. Zey. p.* 111.

Ceylon, central provinces 3000-4000 feet elevation.

12. MEMECYLON FUSCESCENS, *Thw.*—A shrub or small tree, leaves membranaceous shining obscurely venose ovate or elliptic more or less narrowed at the base, $1\frac{1}{2}$-3 inches long (the acumen 4-6 lines) by 6-11 lines broad, very shortly petiolate, peduncles short sparingly branched, few flowered, pedicels nearly obsolete, calyx-disk plane, berry spherical 4 lines in diameter. *Thw. En. Pl. Zey. p.* 111.

Ceylon, Kokool corle at no great elevation.

13. MEMECYLON MACROPHYLLUM, *Thw.*—A shrub, leaves coriaceous cordato or subcordato-lanceolate, very shortly petiolate, 6-12 inches long by 2-$3\frac{1}{2}$ inches broad, peduncles very short or almost obsolete, pedicels short, calyx-disk plane, petals pale blue, berry spherical 4 lines in diameter. *Thw. En. Zey. p.* 111.

Ceylon, Ambagamwa and Pasdoon corle at 1000-3000 feet elevation (perhaps not distinct from No. 14.)

14. MEMECYLON JAMBOSOIDES, *Wight.*—A shrub, branches terete, leaves from ovate or ovato-lanceolate to narrow lanceolate, terminating in a long finely pointed acumination, very firm and coriaceous, 6-12 inches long by $1\frac{1}{2}$-$2\frac{1}{2}$ inches broad, 3 nerved from the base, the lateral nerves submarginal and forming a broad vein into which the primary veins run, all prominent particularly beneath, petioles 4-6 lines long, inflorescence axillary or from the old axils, peduncles scarcely any beyond a bracteated tubercle, pedicels about the length of the calyx, flower-buds conical pointed, calyx-disk radiately 8 winged, wings not very prominent, petals blue, berry spherical 4 lines in diameter. *Wight Icones. tab.* 277 ; *Ill. p.* 215.

Common on the Tinnevelly and Travancore ghats up to 3000 feet, and in Ceylon. I have some doubts if the Ceylon plant is the same as the Indian one, the leaves are of a much deeper green and the venation much less prominent, the flowers smaller and on distinct peduncles. My specimens are not perfect enough to see if the disk of the calyx is radiately winged, which it distinctly is in the Indian plant.

15. MEMECYLON PROCERUM, *Thw.*—A tree 30-40 feet high, leaves ovato-lanceolate gradually acuminate channelled at the costa rounded or slightly attenuated at the base, paler beneath, 6-10 inches long by $1\frac{3}{4}$-5 inches broad, primary veins scarcely conspicuous, petiole sulcate above 3-5 lines long, peduncles and pedicels none or almost obsolete, calyx 2 lines in expansion, plane on the inside, berry spherical crowned with the calyx limb. *Thw. En. Pl. Zey. p.* 415.

16. MEMECYLON CUNEATUM, *Thw.*—A small tree, leaves coriaceous opaque veinless, rotundate or oblong obtuse cuneate at the base, 1-2½ inches long by ½-1½ inches broad, petiole 1 line long, peduncles none, flowers crowded on very short pedicels, flower bud acute, margin of the calyx subentire, disk within plane, petals pale blue, berry spherical. *Thw En. Pl. Zey. p.* 112.

Ceylon, central province, at 3000 feet elevation.

17. MEMECYLON ORBICULARE, *Thw.*—A small tree, leaves coriaceous rather shining, orbicular, obscurely and obtusely acuminate or retuse, 1½-2 inches long by about the same breadth, very shortly petioled, primary veins scarcely conspicuous, peduncles short or nearly obsolete, pedicels about as long as the calyx, calyx-disk plane, petals blue. *Thw. En. Pl. Zey. p.* 112.

Ceylon, Hinidoon corle at 1000 feet elevation.

18. MEMECYLON OVOIDEUM, *Thw.*—A small tree, leaves very coriaceous opaque obovato-rotundate retuse subsessile, 2-4 inches long by 1¾-3 inches broad, peduncles nearly obsolete, pedicels fasciculate crowded, about equalling the calyx, calyx disk plane, berry ovoid 6 lines long 4 lines broad dark purple. *Thw. En. Pl. Zey. p.* 112.

Ceylon, Ambagamwa district near Adam's Peak, 4000-5000 feet elevation.

19. MEMECYLON TERMINALE, *Dalz.*—A shrub 2-3 feet high, branches dichotomous slender young ones 4 angled, leaves sessile or subsessile lanceolate acuminate obscurely penniveined 2-2½ inches long, below the middle 9-10 lines broad rounded at the base, peduncles axillary and terminal solitary ½ an inch long, pedicels umbellate ½ the length of the peduncle, berry globose dry size of a large pea. *Dalz. in Hook. Jour. of Botany, vol.* iii. *p.* 121.

On the Canara ghats.

20. MEMECYLON AMABILE, *Bedd.*—A small tree or large shrub, the young branches acutely 4 angled, young leaves a deep blue color, leaves subcoriaceous veinless opaque deep green above very pale beneath subsessile from ovate to cordato-lanceolate with a gradually attenuated blunt point, 2-3 inches long by 10-14 lines broad, petioles 1 line long or sometimes none, peduncles axillary and terminal solitary or twin slender 6-9 lines long umbelliferous at the apex sometimes branched, dilated at the apex into a scaly receptacle, pedicels slender 2-3 times as long as the calyx, with a small bract at the base of each, calyx-lobes very small or obsolete, petals rounded, disk plane within, flowers deep blue small crowded, placenta 5 ovuled.

Common on the South Canara ghats up to 2000 feet elevation.

21. MEMECYLON GRACILE, *Bedd.*—A small tree or large shrub, young branches obsoletely 4 angled, leaves subcoriaceous ovate with a long gradually blunt acumination quite veinless of a bright green on both sides or a little paler beneath, 1½-1¾ inches long by 8-9 lines broad, petioles 1-2½ lines long, peduncles axillary solitary drooping slender 4-6 lines long 3 flowered bracteated at the apex, pedicels 2-3 inches long with 2 bracteoles a little above the base, flowers small, calyx white, disk radiately winged within, petals pale blue, placenta 3-4 ovuled.

Travancore and Tinnevelly ghats.

22. MEMECYLON ELLIPTICUM, *Thw.*—A small tree branchlets 4 angled, leaves rather shining elliptic abruptly rostrato-acuminate with the point obtuse, rounded or sparingly attenuated at the base, 2-3 inches long (of which the acumen is ½ an inch) by 1¼-1¾ inches broad, petiole ½ a line long, inconspicuously venose, peduncles very short or nearly obsolete, pedicels crowded about equalling the calyx, calyx plane within, petals white. *Thw. En. Pl. Zey. p.* 112.

Ceylon, Singhe rajah forest between Galle and Ratnapoora at no great elevation.

23. MEMECYLON ELEGANTULUM, *Thw.*—A shrub, branchlets 4 angled, leaves lanceolate with a long obtuse acumination, more or less narrowed at the base obscurely venose, 2-3 inches long (of which the acumen is ½-¾ inch) by 6-8 lines broad, petioles very short, peduncles filiform somewhat elongated sparingly branched few flowered, pedicels subsolitary, one half longer than the calyx, calyx plane within, flowers white, berry spherical the size of a pea. *Thw. En. Pl. Zey. p.* 112.

Ceylon, Suffragram district at no great elevation.

24. MEMECYLON VARIANS, *Thw.*—A small tree, branchlets 4 angled, leaves opaque obscurely venose from ovate or elliptic acuminate, acute at the base to rotundate or oblong obtuse at both ends, 1-3 inches long by ½-1½ inches broad, petiole 1-1½ lines long, peduncles short or a little elongated, flowers capitellate very shortly pedicelled, calyx plane within, petals blue or rarely white, berry spherical 3-4 lines in diameter. *Thw. En. Pl. Zey. p.* 112.

Ceylon, central provinces 2000 to 5000 feet.

25. MEMECYLON PARVIFLORUM, *Thw.*—A small tree, branchlets 4 angled, leaves coriaceous opaque veinless rounded or oblong obtuse or retuse or abruptly acuminated with a short obtuse point cuneate at the base, ½-2 inches long by 3-8 lines broad, petiole ½ to 1 line long, peduncles very short or nearly obsolete, flowers capitellate subsessile, calyx plane within, petals white, berry spherical. *Thw, En. Pl. Zey. p.* 113.

Ceylon, central provinces 4000-7000 feet.

26. MEMECYLON PHYLLANTHIFOLIUM, *Thw.*—A shrub or small tree, branches obscurely 4 angled, leaves linear to spathulate very rugose 4-6 lines long by 1-2 lines broad, petioles 1 line long, peduncles axillary 2-3 lines long, 3 flowered at the apex, flowers sessile very small. *Thw. MSS. C. P.* 3900.

Ceylon.

27. MEMECYLON HOOKERI, *Thw.*—An erect shrub 8-12 feet high, sparingly branched, branchlets 4 winged, leaves cordato-lanceolate acuminate sessile, 6-12 inches long by 1½-3 inches broad, the costa, primary veins and the intramarginal vein very prominent beneath, peduncles short or nearly obsolete, pedicels rather long, calyx plane within, petals blue, berry spherical 4 lines in diameter dark purple. *Thw. En. Pl. Zey. p.* 113.

Ceylon, Ambagamwa district in shady forests on banks of streams 1,000 feet elevation.

28. MEMECYLON WIGHTII, *Thw.*—A small tree, branchlets 4-winged, leaves rather shining, cordato-lanceolate more or less acuminate obscurely venose, 2-5 inches long by ¾-1½ inches broad, petiole 1 line long, peduncles very short or nearly obsolete, pedicels crowded rather long, calyx plane within, petals blue, berry spherical 3-4 lines in diameter. *Thw. En. Pl. Zey. p.*113 (*excl. syn*).

Ceylon, central provinces 3000-4000 feet elevation.

29. MEMECYLON ARNOTTIANUM, *Wight. MSS.*—A small tree or large shrub 10-12 feet high, branches terete, the young leaves reddish, leaves rather obscurely 3 nerved, copiously covered with minute scabrous raised dots, ovate with a long terminal blunt acumination, 1-4 inches long by ½-2 inches broad, peduncles slender axillary 8-12 lines with 3-5 sessile flowers at the apex, flowers small, white, calyx-disk plane, berry spherical size of a pea, dark purple. *Thw. En. Pl. Zey. p.* 113. Eugenia ? capitellata, *Arnt. in Walp. Rep.* ii. 182.

Ceylon, Hinidoon and Pasdoon Corle at no great elevation.

30. MEMECYLON GARDNERI, *Thw.*—A small tree, young branches narrowly 4-winged, leaves 3 nerved opaque pellucido-punctulate, rounded elliptic or rhomboideo-oblong abruptly and shortly acuminated with an obtuse or retuse point, narrowed at the base into the petiole, 1-3 inches long by ½-1½ inches broad, petiole 1 line long, capitate 3 flowered shortly peduncled or sessile, flowers white, calyx plane within, berry spherical the size of a pea, dark purple. *Thw. En. Pl. Zey. p.* 113.

Ceylon, central provinces, at an elevation of 2000-5000 feet.

ORDER XL—LYTHRARIEÆ.

Calyx-tube free, but usually enclosing the ovary ; lobes or primary teeth 4, 5, or sometimes more, very rarely 3, valvate in the bud, the sinus sometimes produced externally into as many accessory teeth. Petals as many as primary calyx-teeth or lobes, rarely deficient, inserted at the top of the calyx-tube, usually crumpled in the bud. Stamens as many or twice as many as petals or fewer, or rarely indefinite, inserted in the calyx-tube at various heights ; filaments inflected in the bud ; anthers versatile, with parallel cells opening longitudinally. Ovary rarely inferior (in Punica and Axinandra only) in other genera free from the calyx, but usually enclosed in its tube 2-or more celled, or rarely 1-celled by the abortion of the partitions ; style simple, the stigma capitate or rarely 2-lobed. Ovules usually numerous, anatropous, attached to the axis, or very rarely parietal. Fruit a membranous coriaceous or hard capsule, variously dehiscent, enclosed in or surrounded by the persistent calyx, the valves usually detaching themselves from the central persistent placentiferous column. Seeds without albumen ; testa coriaceous, membranous or rarely thick ; embryo straight ; cotyledons oblong or orbicular-cordate, radicle short ; or rarely cotyledons small and radicle long. Herbs, shrubs or trees, Leaves opposite, verticillate or sometimes alternate, entire, without stipules. Flowers in axillary or terminal panicles cymes or clusters, rarely solitary.

Tribe Lythreæ.—Shrubs or trees, calyx coriaceous or herbaceous often much striated or costate, flowers large or rarely small, petals generally corrugated.

Ovary superior.
- Calyx curved ... ...WOODFORDIA.
- Calyx straight .. ..
  - Stamens twice as many as petals, calyx 12 toothed ... ...PEMPHIS.
  - Stamens twice as many as petals, calyx 4 partite ... ...LAWSONIA.
  - Stamens indefinite, capsule 3-6 celled, forest trees... ... ...LAGERSTRÆMIA.
  - Stamens indefinite, berry 10-15 celled, maritime trees ... ...SONNERATIA.

Anomalous genera.

Ovary inferior.
- Petals 5-7, stamens indefinite, ovary many celled ... ...PUNICA.
- Petals cohering in a cup, stamens 10, ovary 6 celled ... ...AXINANDRA.

The genus Lagerstræmia yields valuable timber trees. L. microcarpa (or the Ven Tek) is one of the commonest timber trees in all our western forests, and on the eastern side of the presidency its place is taken by L. parviflora. L. Reginæ is also very abundant about our Western ghats, and L. lanceolata not uncommon ; beyond this genus the order is of no importance to the forester. Pemphis and Sonneratia are small sea coast trees. Lawsonia a shrub or small tree much used as a hedge plant. Woodfordia an ornamental shrub or small tree of no value. Axinandra a Ceylon tree, and Punica (the Pomegranate) is introduced to Southern India from the North.

Crypteronia and Duabanga are transgangetic genera yielding trees.

Of herbaceous plants not coming under this Flora there is only the genus Ammania, represented in South India by a few small herbs.

WOODFORDIA. Salisb.

Gen. Char. Calyx curved colored tubular obsoletely striated, lobes 6 short with as many minute accessory teeth, petals 6 small inserted on to the top of the tube between the lobes, sometimes wanting. Stamens 12 inserted into the base of the calyx much exserted alternately longer, filaments filiform, anthers broadly ovate, ovary included in the tube of the calyx, sessile oblong 2-celled, style filiform curved attenuated, stigma punctiform, ovules very numerous inserted on to the thick placenta adnate to the axis of the ovary, capsule included in the calyx linear oblong compressed membranaceous, 2-celled, loculicidally 2-valved, placentas swollen many seeded, seed small densely crowded obcuneate subcompressed, testa coriaceous papilloso-pilose, cotyledons oblong compressed 2 auricled at the base, radicle very short. A shrub or small tree, pubescent, leaves opposite subsessile ovato-lanceolate entire and together with the calyx black dotted, peduncles axillary several flowered, flowers scarlet.—Grislea, *Roxb.* (not *Linn.*)

1. Woodfordia tomentosa, *Roxb.*—A large shrub or small tree, branchlets pubescent, leaves ovato-lanceolate somewhat cordate at the base sessile under side hoary and black dotted, upper more or less glabrous, 3-4½ inches long by ¾-1 inch broad, racemes axillary and below the leaves on the old axils, sometimes compressed, bearing 5-15 flowers, flowers rather large bright scarlet.—Grislea tomentosa, *Roxb. Fl. Ind.* ii. *p.* 234. Woodfordia floribunda, *Salisb. Parad. Lond. tab.* 42;—*Bl. Mus. Bot. tab.* 45.

This beautiful shrub or small tree is very common in many jungles and subalpine tracts throughout India, it is more abundant on our eastern coast, than on the west side, and it is also found in China, Africa and Madagascar, it flowers during the cold and beginning of the hot season, it is called Dowaiee in Hindoostanee and Surteylee by the Gonds in the Godavery forests, the flowers are in use as a dye and an infusion of the leaves is employed as a substitute for tea: the wood is only used as fuel.

Analysis of Genera, Pl. XIV, fig. 4.

1. A flower bud (magnified.)
2. A full flower (life size.)
3. The same (magnified) cut open.
4. The young fruit.
5. Ovary cut vertically.
6. The same cut transversely.
7. An ovule (much magnified.)
8. A seed (much magnified.)
9. Embryo. (All copied from Blume's figure.)

PEMPHIS. Forst.

Gen. Char. Calyx campanulate, slightly striate, with 6 short erect triangular primary lobes or teeth, the sinuses produced into as many small accessory spreading ones. Petals 6, oval. Stamens 12, shorter than the calyx, and attached rather above the middle of the tube. Ovary small, 3-celled at the base only, with several ovules in each cell; style rather thick, with a broad capitate stigma. Capsule globular, enclosed in the calyx, transversely circumsciss. Seeds angular or compressed, the testa thick with the angles often expanded into narrow thick wings. A shrub or small tree. Leaves opposite. Flowers solitary in the axils. *Benth. Fl. Aust.* iii. *p.* 300. Maclellandia, *Wight.*

The genus is limited to a single species.

1. Pemphis acidula, *Forst.*—A small and bushy or tall and spreading shrub or small tree, more or less hoary with a minute tomentum. Leaves oblong, obtuse, narrowed into a short petiole, rather thick, 1 nerved, about ½ inch long. Flowers in the upper axils, on pedicels shorter or rarely rather longer than the leaves. Bracteoles none, calyx about 2 lines long the accessory lobes much shorter than the primary ones. Petals 3-4 lines long. Fruiting calyx not much enlarged. *Blume Mus. Bot.* ii. *t.* 43. Maclellandia Griffithiana, *Wight Ic. t.* 1996;—*Benth. Fl. Aust.* iii. *p.* 300.

Sea coast and tidal backwaters in Travancore, Tinnevelly, Malabar and Ceylon, also throughout tropical Asia, the Pacific islands and in Australia.

Analysis of Genera, Pl. XIV, fig. 5.

1. A fragment of a branch in flower and fruit (life size.)
2. A flower bud.
3-4. Full flower petals removed.
5. Ovary cut vertically.
6. The same cut transversely.
7. The fruit.
8. Vertical section of the same.
9. The seed (much magnified.)
10. The same (life size.)
11. Seed cut vertically.
12. Embryo. (All copied from Blume's drawing.)

LAWSONIA. Linn.

Gen. Char. Calyx tube broadly turbinate; lobes 4 ovate-triangular, the sinuses acute without accessory lobes. Petals 4 broad, sessile. Stamens 8, inserted round an annular disk at the top of the calyx-tube, almost in the same row as the petals, and alter-

nating with them in pairs ; filaments rather thick. Ovary filling the calyx-tube, flat-topped or depressed in the centre, 4 celled with very thin dissepiments and many ovules in each cell ; style filiform, with a small capitate stigma. Capsule nearly globular, surrounded at the base by the persistent calyx, bursting irregularly. Seeds numerous, cuneate, angular ; testa thick. A shrub or small tree, leaves opposite. Flowers in loose racemes forming leafy panicles. *Benth. Fl. Aust.* iii. *p.* 300. Alcanna, *Gærtn.*

The genus is limited to a single species.

1. Lawsonia alba, *Lam.*—A glabrous much-branched shrub or small tree, with divaricate branches, the smaller ones often spinescent. Leaves from obovate and obtuse to ovate or lanceolate and acute, narrowed into a short petiole rarely above 1 inch long, thin and penniveined. Flowers white, numerous, in little loose racemes forming usually a large terminal pyramidal leafy panicle, the ultimate branches usually leafless, and the bracts very minute or none. Pedicels 1 to 2 lines long. Buds globular. Calyx-tube not 1 line diameter, the lobes spreading to a diameter of 3 lines. Petals not twice as long as the calyx-lobes. Capsule about 3 lines diameter. *Wight. Illust.* i. *t.* 87.

Widely dispersed over tropical and subtropical Africa and Asia and in North Australia, abundant in a cultivated state and much in use as a hedge plant. Roxburgh states that it is indigenous on the Coromandal Coast, but I cannot say that I ever saw it truly wild in this Presidency ; the flowers are deliciously fragrant ; the plant is well known by its Hindoostani and Persian names Mendee and Henna, the fresh leaves are beaten up into a paste with Catechu and used by native women to dye the nails and skin of a reddish orange color, the timber is tough.

Analysis of Genera, Pl. XIV, fig. 6.

1. A portion of a stem in leaf.
2. A flowering branch.
3. A fruiting branch (all life size.)
4. A flower bud.
5. A full flower, 2 petals removed.
6. Anthers, front and back view.
7. Calyx and style.
8. Ovary cut vertically.
9. The same cut transversely.
10. Fruit cut transversely.
11. A seed.
12. The same cut vertically.
13. The same cut transversely.
14. Embryo.

LAGERSTRÆMIA. Linn.

For Gen. Char. see letter-press to Pl. xxix.

1. Lagerstræmia Reginæ, *Roxb.*—For description, &c. see Pl. xxix.

2. Lagerstræmia microcarpa, *Wight.*—For description, &c. see Pl. xxx.

3. Lagerstræmia parviflora, *Roxb.*—For description, &c. see Pl. xxxi.

4. Lagerstræmia lanceolata, *Wall.*—For description, &c. see Pl. xxxii.

SONNERATIA. Linn.

Gen. Char.—Calyx thick, the tube broadly campanulate, aduate to the ovary at the base, lobes 4 to 8, lanceolate or triangular, the sinuses acute without accessory lobes or teeth. Petals 4 to 8, narrow or none. Stamens numerous, inserted at the top of the calyx-tube, inflected in the bud. Ovary enclosed in and partially adnate to the calyx tube, depressed globular, 10 to 15 celled ; style elongated with a small capitate stigma. Fruit large depressed, fleshy, and indehiscent, surrounded by the persistent calyx, and adnate to it at the base. Seeds immersed in pulp, angular, with a thick testa. Embryo curved. Glabrous trees or shrubs. Leaves opposite, petiolate, rather thick. Flowers large, solitary or 3 together in the upper axils or at the ends of the branches. *Benth. Fl. Aust.* ii. p. 301. Aubletia, *Gærtn. Fruct.* 1, 379 *t.* 78. Chiratia, *Montrous.*

1. Sonneratia acida, *Linn. f.*—A tree. Leaves petiolate, broadly obovate or ovate, 2 to 3 inches long. Calyx broad, about 1 inch long divided to below the middle into about 6 thick valvate lobes. Petals linear, scarcely exceeding the calyx. Fruit above 1½ inches diameter. *Wight I. t.* 340 ;—*Rheed. Mal.* 3 *t.* 40.

Malabar, Travancore, Ceylon, sea coast and tidal backwaters widely spread in similar localities over the East Indies, the Archipelago, and in Eastern Africa and N. Australia,—in Ceylon it is called Gedde-killala, wood light and white and used for models, &c. and said to be a good substitute for coal in steamers, the surface roots used as a substitute for cork.

2. Sonneratia apetala is a Bengal species which does not I believe occur in the Peninsula.

Analysis of Genera, Pl. XV. fig. 1.

1. A flower before the stamens unroll.
2. The same cut vertically shewing the insertion of the stamens and the many celled ovary with the thin partitions.
3. A full flower.
4. A petal.
5. Anthers. (Drawn from fresh specimens.)

PUNICA. Linn.

Gen. Char. Calyx turbinate, 5, 7, cleft, æstivation valvular. Petals 5, 7. Stamens numerous filaments distinct. Style filiform. Stigma capitate. Fruit large, globose, crowned by the somewhat tubular limb of the calyx, baccate, indehiscent, covered with the tube of the calyx, divided horizontally into two parts by a dissepiment; the lower division 3 celled, the upper 5-9 celled; dissepiments membranaceous: placentæ in the lower division at the bottom; in the upper stretching from the side of the fruit to the middle. Seeds numerous, nestling in a pellucid pulp. Embryo oblong: radicle short, acute; cotyledons foliaceous, spirally convolute. A small tree or shrub with spinescent branchlets. Leaves deciduous, opposite, rarely verticillate or alternate, often axillary and fascicled, oblong, quite entire, not dotted. Flowers 2-3, nearly sessile on somewhat terminal branchlets, usually scarlet. *W. Prod. p.* 327.

1. Punica granatum, *Linn.*—This is the well known pomegranate, cultivated in gardens throughout S. India, but introduced from the North, it is called Anar in Hindustanee. A decoction of bark of the root is a complete remedy for Tape-worm.

AXINANDRA, Thw.

For Gen. Char. see letter-press to Pl. ccvii.

1. Axinandra Zeylanica, *Thw.*—For description, &c. see Pl. ccvii.

ORDER XLI—SAMYDACEÆ.

Sepals free or united at the base into a 4 or 5-lobed (rarely 2, 3 or 6, or more-lobed) calyx, free from the ovary or more or less adherent. Petals either as many as the sepals or calyx-lobes inserted at their base, persistent with them, and resembling them in consistence, or wanting. Stamens perigynous, indefinite or not corresponding in number with the calyx lobes, or, if equal to them, usually opposite the petals and alternating with small glands or scales. Ovary superior or more or less inferior, with 2, 3 or more parietal placentas and several ovules to each placenta; style entire or more or less divided into as many branches as placentas. Fruit indehiscent or opening in valves between the placentas. Seeds often arillate, with a fleshy albumen. Embryo straight or nearly so, with the radicle next the hilum and flat cotyledons. Trees or shrubs. Leaves alternate, undivided, usually toothed. Stipules small or none. Flowers hermaphrodite or rarely diœcious.

Not an order of much importance. Casearia yields 4 trees but nothing is known of their timber. Osmelia 1 tree only known from Ceylon. Homalium 2 trees, one of which is abundant and yields excellent timber, the timber of the other is unknown.

Tribe I, Caseariæ.—Calyx free 4, 5 merous, petals 0. Stamens in a single series.

St. 6, 15, style simple, flowers fasciculate or corymbose... ... ... Casearia.
St. 8-10, styles 2 or 3, flowers in slender racemes ... ... Osmelia.

Tribe II, Homalieæ.—Calyx free or adnate to the ovary 4-15 merous, petals 4-15. Stamens inserted singly or in clusters opposite the petals.

Ovary more or less inferior ... ... Homalium.

CASEARIA. Linn.

For Gen. Char. see letter-press to Pl. ccviii.

1. Casearia tomentosa, *Roxb.*—A small tree, leaves coriaceous ovate to oblong often cordate at the base and sometimes obliquely sided, conspicuously serrate, not dotted, very velvetty on both sides when young, at length glabrous or subglabrous on the upper side except the costa, 3-5 inches long by $1\frac{1}{2}$-$2\frac{1}{2}$ broad, petioles 2-4 lines long, stipules ovate small downy, flowers small pubescent greenish yellow in dense axillary clusters on pedicels 1-2 lines long, calyx segments oval or orbicular about 1 line long, stamens 8 or rarely only 6, fruit oblong $\frac{3}{4}$-1 inch long rather fleshy sulcated opening in 3 valves. *Roxb. Fl. Ind.* ii. 421.

This small tree is common throughout the presidency and in Ceylon, I am not aware that it is put to any use.

2. Casearia esculenta, *Roxb.*—A small tree or sometimes only a large shrub, leaves subcoriaceous lanceolate bluntly acuminated, acute at the base generally more or less serrated sometimes entire or subentire, glabrous or with a slight pubescence about the costa and veins, punctate and lineolate when held up against the light, 5-7 inches long by $1\frac{1}{2}$-$2\frac{1}{4}$ broad, petioles 4-7 lines long, stipules small caducous, flowers small pubescent greenish yellow in rather dense axillary clusters on pedicels 1 line long, and just the same as in tomentosa. *Roxb. Fl. Ind.* ii. 422. Vareca Zeylanica, *Gærtn.* Casearia Zeylanica, *Thw. En. Pl. Zeyl. p.* 19. Casearia elliptica, *Willd;—Wight's Icones* 1849.

This is equally common with the last species, from which it only differs in the shape of the leaves and in their being more glabrous, punctate, and less serrated, it is generally only a shrub.

3. Caseria varians, *Thw.*—For description, &c. see Pl. ccviii.

4. Casearia Wynadensis, *Bedd.*—A small graceful tree, young parts densely aureo or rufo villous, branches softly pubescent, stipules small linear deciduous, leaves membranaceous penniveined, pellucidly punctate and lineolate, lanceolate with a long acumination at the apex or sometimes only acute or obtusely rounded, rather sharply serrated except near the base, at length glabrous above except the costa softly pubescent beneath especially on the costa and main veins, 4-6½ inches long by 1½-2 broad, petioles softly pubescent 4-6 lines long, flowers small 6-8 fascicled in the axils, pedicels 2-3 lines long pubescent, calyx pubescent on the outside very slightly hairy within, ciliate punctate, lobes 5 rounded, stamens generally 8 rarely 6, staminodes very hairy, ovary oblong attenuated into a style equalling the stamens, both hairy, stigma 2-4 lobed, placentas 2-4. *Bedd. Icones Pl. Indiæ Or. tab.* clix.

A pretty little tree not uncommon on the ghats in Malabar, Travancore, Tinnevelly &c. at 2000-3000 feet elevation.

OSMELIA. Thw.

For Gen. Char. see letter press to Pl. ccix.

1. Osmelia Gardneri, *Thw.*—For description, &c. see Pl. ccix.

HOMALIUM. Jacq.

For Gen. Char. see letter press to Pl. ccx.

1. Homalium Ceylanicum, *Gard.*—For description, &c. see Pl. ccx.

2. Homalium Travancoricum, *Bedd.*—For description, &c. see Pl. ccxi.

ORDER XLII.—DATISCEÆ.

Flowers diœcious, rarely hermathrodite or polygamous. In the male the calyx tube very short or hemispherical, lobes 3-9 short equal or unequal, petals 0 or 8 small, stamens 4-25 opposite the lobes of the calyx, filaments short or elongate, anthers 2 celled dehiscing laterally or towards the inside ; ovary rudimentary small or none. In the female or hermathrodite calyx tubular adnate to the ovary lobes 3-8 short, stamens none or if present as in the male, ovary 1-celled open or shut at the apex, placentas parietal alternate with the calyx lobes, styles as many as the placentas and alternate with them simple or 2-parted stigmatose on the inside or with terminal capitate stigmas, ovules very numerous in 2-many series, anatropal ascending or sub-horizontal. Capsule membranaceous or coriaceous dehiscent many seeded. Seed minute, testa striated or impresso punctate, umbilicus strophiolate, albumen scanty ; embryo cylindric in the axis of the albumen, radicle elongate near the hilum. Trees or herbs pubescent, scurfy or glabrous, leaves alternate simple or pinnate, stipules none, flowers small or middle size in spikes or racemes.

An order only represented in South India by one tree, in Northen India the genus Datisca yields a second.

TETRAMELES. R. Br.

For Gen. Char. see letter press to Pl. ccxii.

1. Tetrameles nudiflora, *R. Br.*—For description, &c. see Pl. ccxii.

ORDER XLIII—ARALIACEÆ.

Calyx-tube adnate to the ovary ; limb forming a slightly raised line or short cup round the summit, truncate or toothed, or quite inconspicuous. Petals 5 or more, or rarely 4 usually valvate and shortly inflected at the tip, and often cohering. rarely with a long inflected point, or obtuse and imbricate, inserted round an epigynous entire disk. Stamens as many as petals or sometimes more, inserted with them round the epigynous disk ; anthers versatile, with parallel cells opening longitudinally. Ovary inferior, 2 or more celled, or very rarely 1 celled by abortion, with 1 anatropous ovule in each cell, pendulous from the summit. Styles as many as cells, either distinct erect and afterwards recurved with small terminal stigmas, or united in a cone, or reduced to a slight protuberance with as many stigmas as cells radiating on the summit and often scarcely conspicuous. Fruit more or less drupaceous and indehiscent, the epicarp succulent rarely nearly dry and thin, always distinct from the endocarp, which is hardened into as many one seeded pyrenes as cells of the ovary, usually laterally compressed. Seed pendulous, testa very thin, albumen the shape of the pyrene, with an even surface; or rarely ruminate. Embryo minute, near the apex of the seed, the radicle superior. Trees, shrubs, or woody climbers, very rarely herbs. Leaves simple, digitate or pinnately compound sometimes very large, the rachis often articulate, the petiole dilated at the base or the dilatations united in an intrapetiolar stipule. Flowers small, often greenish or purple, in umbels heads or rarely racemes, which are usually disposed in large terminal racemes or panicles, the umbels rarely solitary or in compound umbels. Bracts usually small

and often inconspicuous or none. Flowers frequently polygamous, the ovary entirely abortive in the males, the stamens often smaller or rarely wanting in the females.

* Petals more or less imbricate.	
Style free.	ARALIA.
Styles connate into a column	PENTAPANAX.
* Petals valvate.	
Leave, pinnate	POLYSCIAS.
Leaves digitate	HEPTAPLEURUM.

Not an order of much importance to the forester. Heptapleurum yields several large trees very common in our western forests, but their timber is I believe of no value. Polyscias is represented by 1 middling sized tree, and Pentapanax and Aralia each yield one small tree.

The genera Tupidanthus, Brassiopsis, Macropanax, and Helwingia are represented by shrubs or small trees in Northern India, but do not occur in the Peninsula. Fatsia is common in a cultivated state on the Nilgiris.

ARALIA. LINN.

Gen. Char. Flowers sometimes polygamous, calyx with the margin prominent distinctly 5 toothed, petals 5 ovate acute or obtuse, margins more or less imbricate opening separately or cohering and falling off in a lid or calyptra, stamens 5, anthers oblong or ovate, disk nearly flat or rarely conical, ovary 2-5 celled, styles as many as the ovary cells at first erect at length recurved, berry angulate or ribbed 2-5 celled. Trees, shrubs or herbs sometimes aculeate or setose, leaves alternate decompound usually twice or thrice pinnate, very rarely digitate, leaflets serrate, flowers variously umbelled, pedicels articulated below the flower. Panax. Section. 1. *DC. Prod*, iv. *p.* 252. Aureliana, *Lafit.* Aralia, *DC. Prod.* iv. 257. *Ex parte.* Dimorphanthus, *Miq. Comm. Phytogr.* 95 *t.* 22.

1. ARALIA MALABARICA, *Bedd.*—A small tree or large shrub, the whole plant more or less aculeate and setose particularly the young parts, leaves 2-3 feet long bipinnate with a pair of leaflets on the common petiole at the base of each opposite pair of pinnæ, pinnæ several pair, with 2-4 pair of leaflets on each and 1 terminal one, leaflets sessile or very shortly petiolate often oblique at the base ovate cordate to lanceolate terminating in a long fine acumen, simply or doubly serrate, 3-5½ inches long, 1-1¾ inches broad, aculeate and densely setose when young (as is the petiole) but more glabrous in age, the umbels pedunculate on the branches of a large spreading panicle, flowers about 20 in a head on pedicels about ½ an inch long, bracts and bracteoles prominent and persistent, fruit slightly 10 ribbed.

This small tree is confined to our Western mountains, where I have found it in various parts from Malabar down to S. Travancore, it is common on the Carcoor ghat in Wynad.

Analysis of Genera, Pl. XV, fig. 2.

1. A portion of a very young pinnæ shewing the aculeate and setose petiole and leaflets.
2. Portion of a leaflet (life size) shewing venation serratures and scattered hairs.
3. An umbel of flowers after dehiscence of the petals.
4. An umbel (much magnified) most of the pedicels and flowers removed and shewing the ciliate bracteoles.
5. A flower bud (highly) magnified, petals slightly imbricate at the sides.
6. A flower, petals opening separately and slightly imbricate at the sides.
7. A petal inside view shewing the central rib.
8. A flower from which the petals have just dehisced as a calyptra.
9. Petals (joined into a calyptra) just after dehiscence.
10. Anthers, front and back view.
11. Young fruit and reflexed styles.
12. Same cut vertically.
13. The same cut transversely.

PENTAPANAX. SEEM.

Gen. Char. Margin of the calyx 5-toothed, petals 5 slightly imbricate at the sides, opening separately or falling off in a calyptra, stamens 5, anthers ovato-oblong, disk convex conical in the middle and rising into the column of styles, ovary 5 celled, styles 5 connate very short or produced into a column, stigmas terminal, fruit subglobose or globose not angled, the exocarp fleshy, pyrenes 5 crustaceous. Trees or shrubs often epiphytic and subscandent, leaves 3-foliate or pinnate serrate or entire, flowers umbelled. *Seem. Journ. of Bot.* ii. 294. Hedera, *Wight. Icones.* 307.

1. PENTAPANAX LESCHENAULTII, *DC.*—A shrub or small tree often epiphytic, unarmed glabrous, leaves 6 inches to 2 feet long trifoliate or unequally pinnate with 2 pair of leaflets, leaflets ovate often unequal at the base with a prominent acumination, sharply and closely serrate the serratures often glandular, submembranaceous, beautifully reticulated, 4-5 inches long by 2-2½ broad, petioles ¼-½ inch long, (or 1-2½ inches in the terminal leaflet) panicle corymbiform, bractes deciduous, flowers umbellate very numerous, on pedicels about ½ an inch long, petals slightly imbricate combined and falling off in a calyptra, disk 5 angled convex, berry globose not angled or ribbed. Panax Leschenaultii, *DC. Prod.* iv. 254. Hedera Leschenaultii et trifoliata, *WA. Prod. p.* 377 ;—*Wight's Icones tab.* 307.

Common on the higher ranges of the Nilgiris and other mountains on the Western side of this Presidency often epiphytic in the fork of large trees.

Analysis of Genera, Pl. XV, fig. 3.

1-2. Portions of a leaflet (life size) shewing the venation and serratures.
3. A flower bud, calyx 5-toothed, petals slightly imbricate.
4. A flower just after the dehiscence of the petals showing the anthers, 5 angled disk at the apex of the ovary, and the styles combined into a column.
5. The petals just after dehiscence combined in a calyptra.
6. Anthers front and back view.
7. The column of styles 5 joined into 1 with 5 apical stigmas.
8. An umbel of flowers just after the dehiscence of the petals.
9. An umbel of flower buds.
10. Fruit cut transversely.

POLYSCIAS. Forst.

For Gen. Char. see letter press to Pl. ccxiii.

1. Polyscias acuminata, *Wight.*—For description &c. see Pl. ccxiii.

HEPTAPLEURUM. Gærtn.

For Gen. Char. see letter press to Pl. ccxiv.

1. Heptapleurum racemosum, *Wight.*—For description &c. see Pl. ccxiv.

2. Heptapleurum rostratum, *Wight.*—A very large tree, glabrous except the scurfy inflorescence, leaves digitate, leaflets 5-9 ovate-lanceolate to elliptic, distantly serrated, acute or acuminated at the apex, 5-7 inches long by 1¾ to 2¼ broad, stipules adnate to the petiole at the base only united within it into a single lamina which is obtuse and emarginate or sometimes mucronate, petiolule 1-2 inches long, umbels in a much branched terminal scurfy panicle, bractes sheathing and conspicuous, lateral branches with from 1 to 6 umbels, flowers numerous on pedicels 4 lines long parts of the flowers usually 5-rarely 6-7, united styles short forming a beak. *Wight. Icones. tab.* 1,013.

Nilgiris and Anamallays at 5-6000 feet elevation.

3. Heptapleurum obovatum, *Wight.*—A middling sized or small tree, glabrous in all its parts, leaves digitate, leaflets 5-6 or rarely 7 obovate broadly oval or nearly orbicular 2-4 inches long, on petiolules 1-2 inches long, panicles numerous aggregated at the ends of the branches ebracteolate, umbels solitary on the lateral peduncles, flowers 3-20 in each umbel on pedicels about 4 lines long, parts of the flower 6-8, petals often deciduous in a combined lid or calyptra. *Wight. Icones. tab.* 1011.

A common tree in all our western ghat forests from 2000 to 6000 feet elevation, it differs much in the shape of the leaflets and number of flowers in the umbels, in specimens from the Anamallays the leaflets are almost orbicular and the flowers 3-7 only in each umbel.

4. Heptapleurum venulosum, *WA.*—A small tree, glabrous in all its parts, leaves digitate, leaflets 5-7 elliptic or oval oblong, sometimes broader at the apex obtuse or with a sudden acumination, coriaceous, shining above, 3-8 inches long by 1½-2½ broad, on petiolules 1-2 inches long, venation very prominent. Stipules adnate to the petiole at the base only united within it into a single obtuse lamina, panicles crowded at the ends of the branches shorter than the leaves, umbels solitary on the lateral peduncles 6-20 flowered, bracteoles at the base of the peduncles, gradually acuminated from a broad base, chaffy deciduous, flowers often unisexual the males with exserted stamens and scarcely any rudiment of an ovary, females often with more or less perfect stamens, parts of the flowers 5-6 Paratropia venulosa, *WA. Prod. p.* 377 ;—*Wight's Ill. tab.* 118. Aralia digitata, *Roxb. Fl. Ind.* ii. 107.

A small tree, sometimes subscandent ; common on both sides of the presidency and in Bengal, also found in Australia.

5. Heptapleurum Wallichianum, *WA.*—Somewhat arboreous, glabrous, leaves digitate; leaflets 8-10, long petioled, oblong pointed quite entire coriaceous, veins not prominent, panicles numerous at the ends of the branches, bracteoles caducous, flowers pedicelled and umbelled numerous, parts of the flower 6. *WA. Prod. p.* 377.

Courtallum (I have no specimens of this tree).

6. Heptapleurum exalta, *Thw.*—A large tree, glabrous, leaflets 7-9 coriaceous glabrous entire oblong rounded at the base or subcordate, venation not prominent 5-10 inches long by 2¼-4 inches broad, petiolules ½-2½ inches long, umbels 10-15 flowered rather long pedunculate, racemose, parts of the flower 8-9. *Thw. En. Pl. Zey. p.* 132.

Ceylon 4000-6000 feet.

7. Heptapleurum capitatum, *WA.*—Arboreous ? leaves digitate, leaflets 6-9 long petioled oblong suddenly and shortly acuminate retuse at the base quite entire somewhat coriaceous without prominent veins, furfuraceous when young particularly on the midrib, petiole furfuraceous, panicle elongate with a concave persistent bractea at the base of the elongated peduncles, flowers sessile numerous capitate, parts of the flower 6-9. *WA. Prod. p.* 376.

Tinnevelly and Travancore mountains (I have no specimens of this tree.)

8. HEPTAPLEURUM TEREBINTHACEA, *Vahl.* and 9. HEPTAPLEURUM EMARGINATUM, *Mooré,* are scandent and epiphytic shrubs occurring only in Ceylon, and I have an undescribed epiphytic species from the Tinnevelly hills with very small leaflets but it is not in flower. From the Western slopes of the Nilgiris I also have what I believe to be an undescribed species a large tree, but my specimens are not perfect enough for description, it has axillary panicles with the lateral branches many umbelled, leaflets 5 elliptic entire terminating in a long very gradual acumination, venation not prominent.

ORDER XLIV—CORNACEÆ.

Flowers hermaphrodite or unisexual regular, calyx tube adnate to the ovary, limb obsolete, or forming a raised border, entire or with as many teeth as petals, æstivation open or valvate, petals 4-5 rarely more or none, or valvate or imbricate inserted round the epigynous disk or on the calyx border, stamens inserted with the petals and as many or twice or four times as many, filaments short or elongate, filiform subulate or flat, anthers fixed by the base or at the back with parallel cells opening longitudinally, disk epigynous, angulate crenate or lobed rarely annular or shortly tubulose, ovary inferior 1-4 celled, style short or elongate, stigma capitate truncate entire or lobed, ovule solitary very rarely 2 in the cells pendulous anatropous, raphe lateral or dorsal, fruit an indehiscent drupe with a 1-4 celled putamen rarely with 2 bony or crustaceous pyrenes, seed oblong pendulous, testa membranaceous or slightly coriaceous, albumen copious fleshy, embryo straight small or large, the radicle superior and shorter than the flat cotyledons.

Trees or shrubs glabrous or sericeo-pilose, leaves opposite or alternate entire or slightly lobed, stipules none, flowers in terminal or axillary cymes or fasciculate in the axils.

This order is only represented by 2 genera in Southern India. Alangium and Mastixia, the former is common throughout the presidency, the latter is confined to the western ghats.

Marlea, Cornus, Aucuba, Nyssa and Toricellia are Himalayan genera yielding shrubs or small trees, but they do not occur in the Peninsula.

ALANGIUM. LAM.

For Gen. Char. see letter press to Pl. ccxv.

1. ALANGIUM LAMARCKII, *Thw.*—For description, &c. see Pl. ccxv.

2. ALANGIUM GLANDULOSUM, *Thw.*—Is a small subscandent tree found in Ceylon and described by Dr. Thwaites in his En. Pl. Zey. p. 133, it is allied to the last very protean species, but is distinguished by its much smaller flowers and fruit, by the deep red glandular furfurescence, on the young shoots and inflorescence, and its glandular petals.

MASTIXIA. BL.

For Gen. Char. see letter press to Pl. ccxvi.

1. MASTIXIA ARBOREA, *Wight.*—For description, &c. see Pl. ccxvi.

ORDER XLV—CAPRIFOLIACEÆ.

Calyx-tube adnate to the ovary, the limb short, truncate or of 4 or 5 rarely more lobes or teeth. Corolla gamopetalous, inserted round the epigynous disk ; lobes 4 or 5 rarely 3, imbricate in the bud. Stamens as many as lobes of the corolla, alternate with them, inserted in the tube ; anthers versatile with parallel cells opening longitudinally. Ovary inferior, 2 to 5-celled or rarely 1-celled, with 1 or more pendulous ovules in each cell. Stigmas as many as cells, or united into one, sessile or on a single filiform style. Fruit an indehiscent berry, or rarely dry, 1 to 5-celled. Seeds 1 or more in each cell. Embryo in the axis of a fleshy albumen ; radicle superior, cotyledons oval or oblong. Trees, shrubs, or climbers, rarely herbs. Leaves opposite, usually without stipules, simple or rarely pinnate.

A small order nearly allied to Rubiaceæ, of no importance to the forester. Viburnum yields 3 small trees common on our Western mountains, Lonicera one shrub common on the Nilgiris, and Dichilanthe one good sized tree peculiar to Ceylon. Leycesteria and Abelia are Himalayan genera each yielding a shrub but they are not represented in the Peninsula. The only other representative of the order in S. India is the Nilgiri honeysuckle (Lonicera Leschenaultii) a climber, besides the honey-suckles, the Elder (Sambucus) the Lauristinus and the Gelder-rose belong to the order, the 2 latter being species of Viburnum.

Tribe Loniceræ.— Corol-tube elongate, style filiform, raphe extrorse.

Ovary 2-3 celled, ovules many pendulous	LONICERA.
Ovary 2-celled, ovules solitary pendulous	DICHILANTHE.

Tribe Sambuceæ.—Corol rotate or shortly tubular, stigmas 3 sessile, raphe introse or lateral.

Leaves simple	VIBURNUM.

LONICERA. DESF.

Gen. Char. Calyx-limb 5-toothed, corol with a more or less elongated tube and an oblique limb either 5-lobed or in 2 lips, the upper one 4-lobed, the lower entire. Stamens 5, ovary 2-3 celled with several pendulous ovules in each cell, style filiform with a

capitate stigma, berry small fleshy few or many seeded, 2-3 celled or 1 celled from the obliteration of the partitions. Erect shrubs or climbers, leaves opposite entire, flowers 2 or more together sessile in axillary or terminal heads.

1. LONICERA LIGUSTRINA, *Wall.*—A shrub or very small tree 10-15 feet, bushy, young branches pubescent, leaves lanceolate or ovate-lanceolate acute shortly petioled, quite entire shining, sprinkled on the margin and whilst young on the midrib beneath with spreading hairs, 1-3 inches long, peduncles 2-3 lines long, pubescent slightly drooping at the apex axillary and solitary 2-or rarely 3-flowered, a setaceous subulate bract at the back of each ovary, and a cup-shaped bracteole closely surrounding and retaining both ovaries, or when there are 3 flowers all 3 ovaries, calyx limb constricted in the middle, the margin 5-toothed, teeth oblong short, corol puberulous or glabrous, the tube slender, gibbous above the base $\frac{1}{4}$-$\frac{1}{2}$ an inch long, ovaries 3-celled, cells 1-2 ovuled, berries globose distinct covered by the bracteole, seeds 2-4 large. *Wall*;—*Roxb. Fl. Ind.* (*ed Wall.*) ii. 179;—*WA. Prod. p.* 389;—*Wight. Ill. tab.* 121; *Icones tab.* 1025.

Very common on the Nilgiris and much in use as a hedge plant: also found on the Himalayas.

Analysis of Genera. Pl. XV, fig. 5.

1. A portion of a branch in flower (life size.)
2. A two flowered peduncle.
3. A peduncle with 3 flowers.
4. A flower opened to show the stamens.
5, 6, 7. Anther, front, back and side view.
8. Ovaries just after the fall of the flower.
9. The same cut vertically shewing the pendulous ovules.
10. The same cut transversely shewing 3 one-two ovuled cells in each.

DICHILANTHE. THW.

Gen. Char. Limb of the calyx shortly tubular within 5-scaled, 5-parted, corol infundibuliform curved, mouth bilabiate, upper lip 2 toothed, lower 3 toothed, stamens 5 ovary 2 celled, ovules solitary pendulous. A tree branches terete, leaves lanceolate coriaceous entire, flowers terminal sessile crowded. *Thw. in Hook. Kew. Journ. of Bot.* viii. *p.* 270-376.

1. DICHILANTHE ZEYLANICA, *Thw.*—A tree, 30-40 feet high, leaves 3-7 inches long by $1\frac{1}{2}$-$2\frac{1}{2}$ inches broad.

Ceylon, in forests between Galle and Ratnapoora at 1000 feet elevation.

Analysis of Genera, Pl. XV, fig. 4.

1. A flower.
2. The corol opened out.
3. An anther.
4. Stigma.
5. Ovary cut vertically.
6. The same cut transversely.
7. An ovule. (From Dr. Thwaites's drawing all magnified.)

VIBURNUM. L.

For Gen. Char. see letter-press to Pl. ccxvii.

1. VIBURNUM PUNCTATUM, *Ham.*—For description, &c. see Pl. ccxvii.

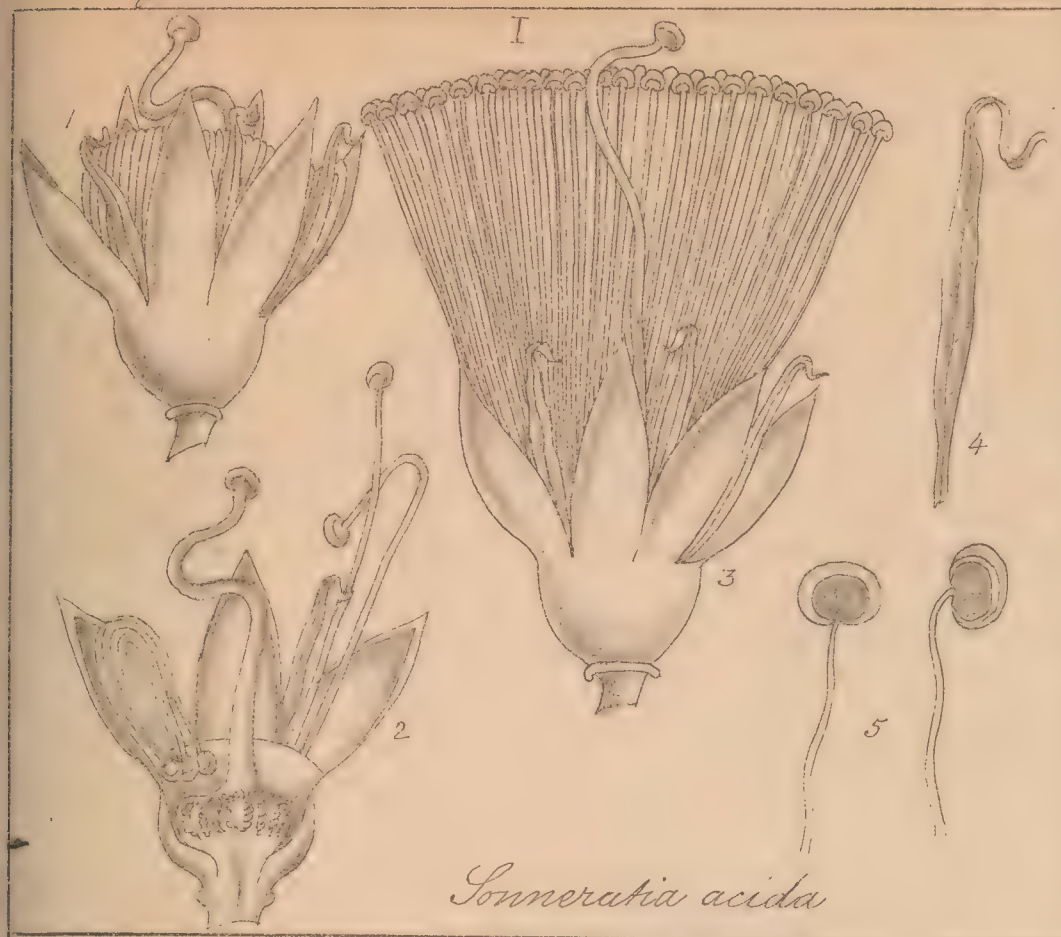
2. VIBURNUM ERUBESCENS, *Wall.*—A small tree, leaves ovate ovato-cordate or lanceolate acuminate, entire in the lower half, dentato-serrate above the middle, upper side glabrous, under side puberulous when young except the nerves and axils, 1-4 inches long, corymbs paniculate terminal or lateral pendulous, 1-4 inches long, flowers $\frac{1}{2}$ inch long, ovary glabrous, corol-tube 3 times longer than the lobes cream colored or pale pink, berry small ovate-oblong. *Wall. Cat.* 459 *and* 7474, *and Plant. As. Rar.* ii. *p.* 29 *t.* 134. V. Wightianum, *Wall. Cat.* 3729;—*WA. Prod.* 388, *and Wight Icones t.* 1024.

This small tree is common about Ootacamund and other mountains on the western side of this presidency, at elevations above 4000 feet, and in Ceylon, it is also common on the Himalayas.

3. VIBURNUM HEBANTHUM, *WA.*—A small tree, 15-20 feet, leaves glabrous except in the axils of the nerves, coriaceous, paler beneath and sometimes glanduloso-punctulate, elliptic oblong, oblong-lanceolate or obovate, acute or with a long acumination generally entire, or inconspicuously sinuato-dentate, 2-6 inches long, corymbs terminal subumbellate 3-6 partite, many flowered, glanduloso-puberulous, flowers $\frac{1}{4}$ inch long-calyx-limb shortly 5-lobed, corol pubescent puberulous or glabrous, lobes short obtuse erect, stamens exserted, ovary verrucose, berry small $\frac{1}{4}$ inch long elliptico-oblong. *WA. Prod. p.* 388;—*Wight Icones tab.* 1023. V. coriaceum, *Bl. Bijd.* Viburnum capitellatum, *WA. Prod. p.* 388. V. cylindricum, *Ham. in Don. Prod.* 142. V. Zeylanicum, *Gard.*

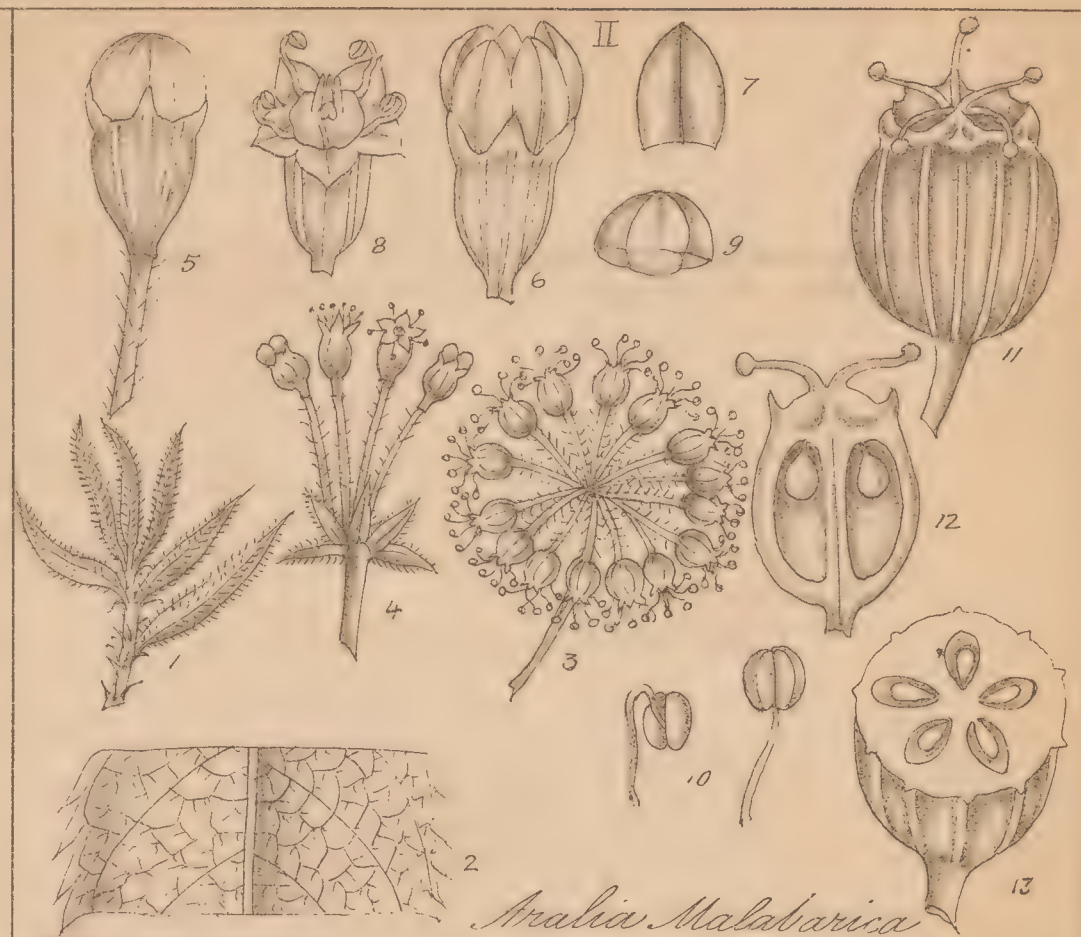
Nilgiri mountains, Pulneys, and other hills on the west side of the presidency at elevations above 5000 feet and in Ceylon; very common, also found on the Himalayas and in Java.

I



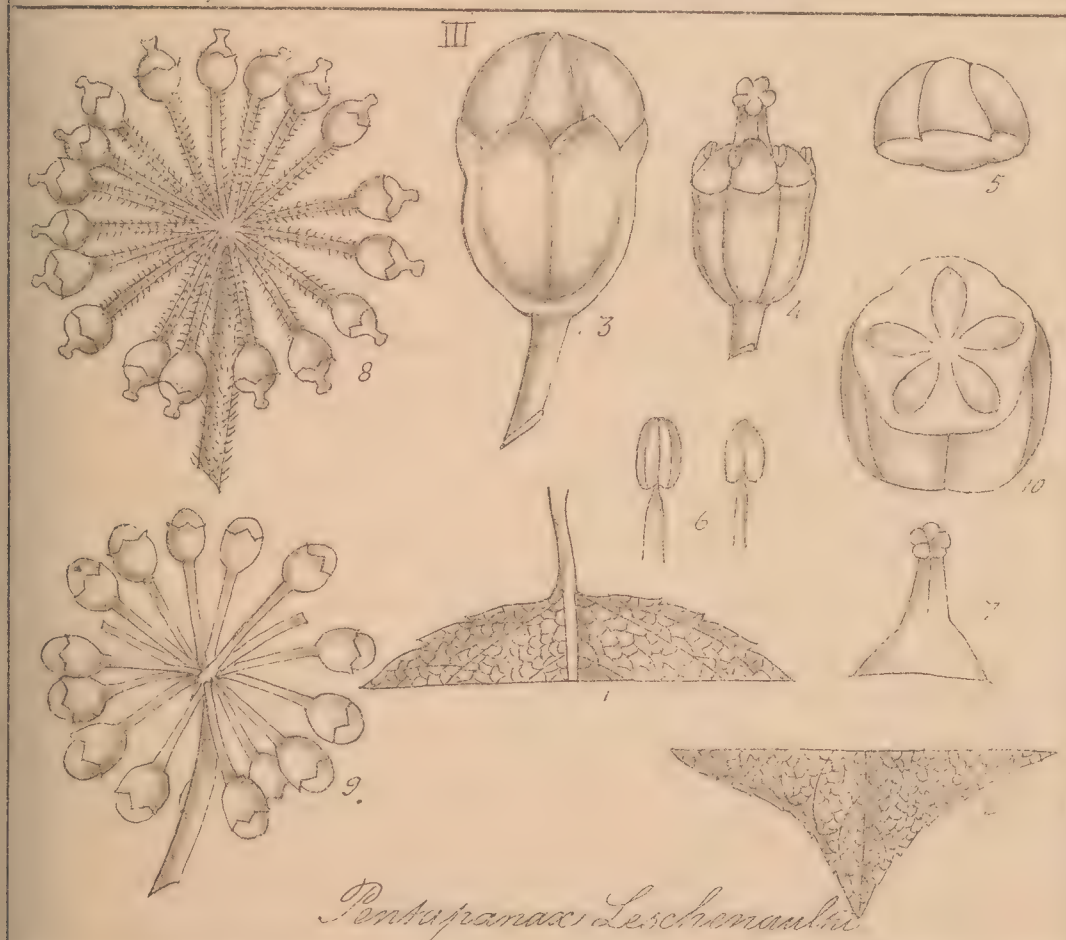
Sonneratia acida

II



Aralia Malabarica

III



Pentapanax Leschenaultii

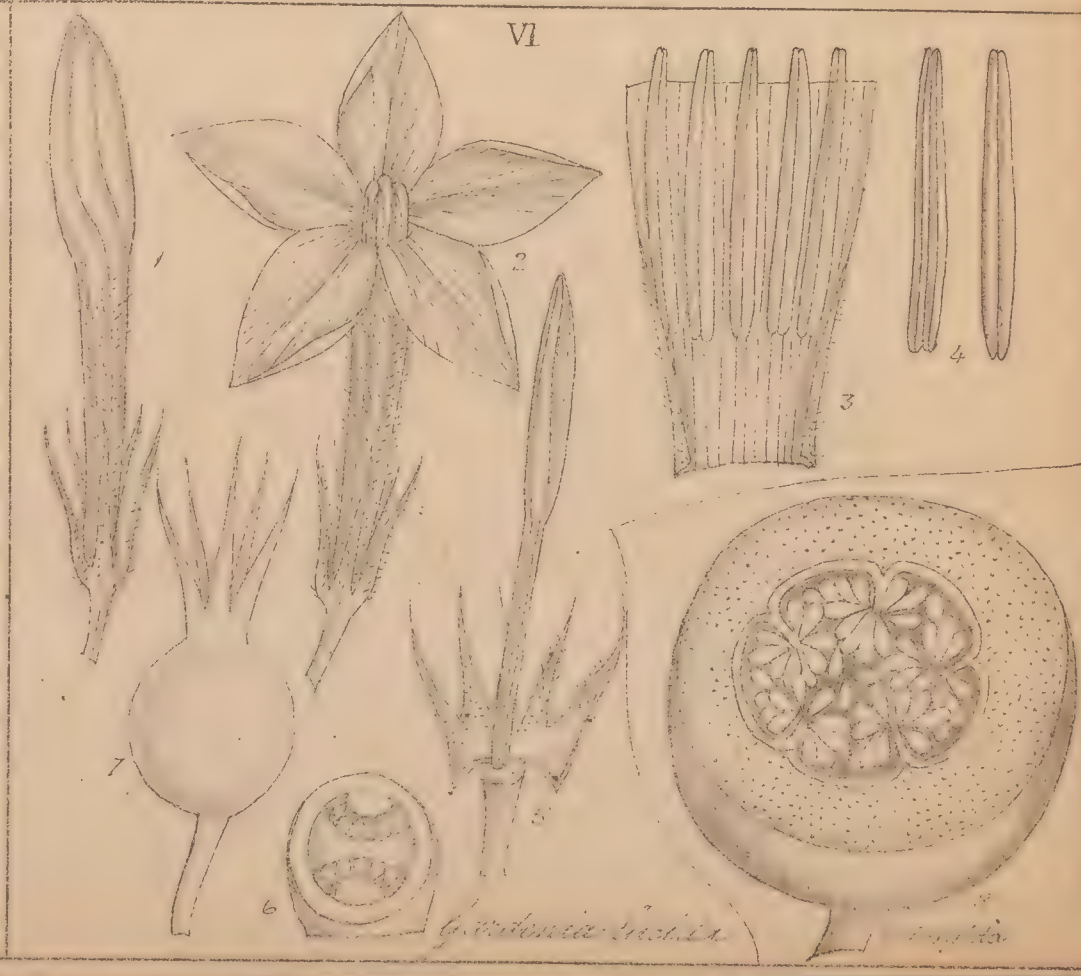
IV

Dichilanthe Zeylanica

V

Lonicera ligustrina

VI



Gardenia Zeylanica *Ixora*

Randia uliginosa — *Rubiaceæ*

Randia uliginosa

Randia dumetorum

Webera Asiatica

Mussœnda frondosa

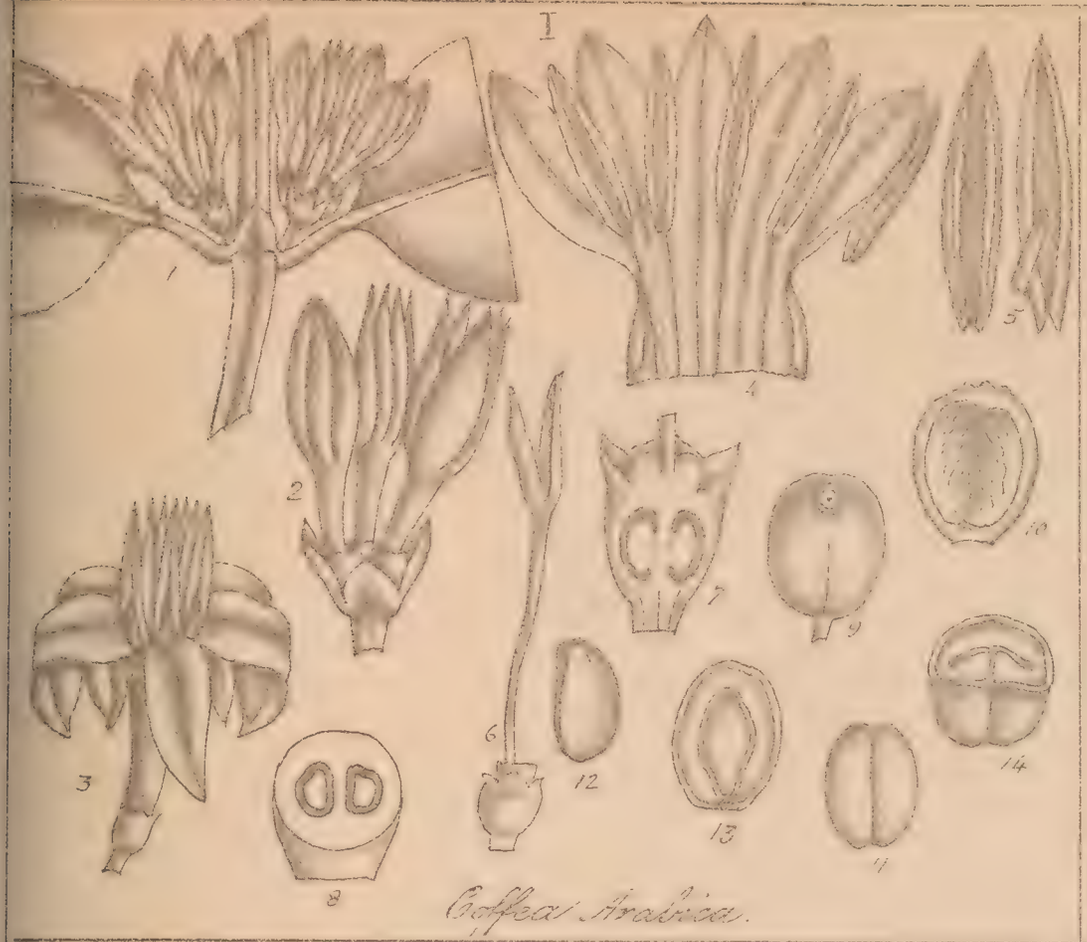
Simonius Sambosella

Urophyllum Zeylanicum

Scyphostachys coffeoides

Barraphy Lith:

I



Coffea Arabica.

II

Gaertnera speciosa

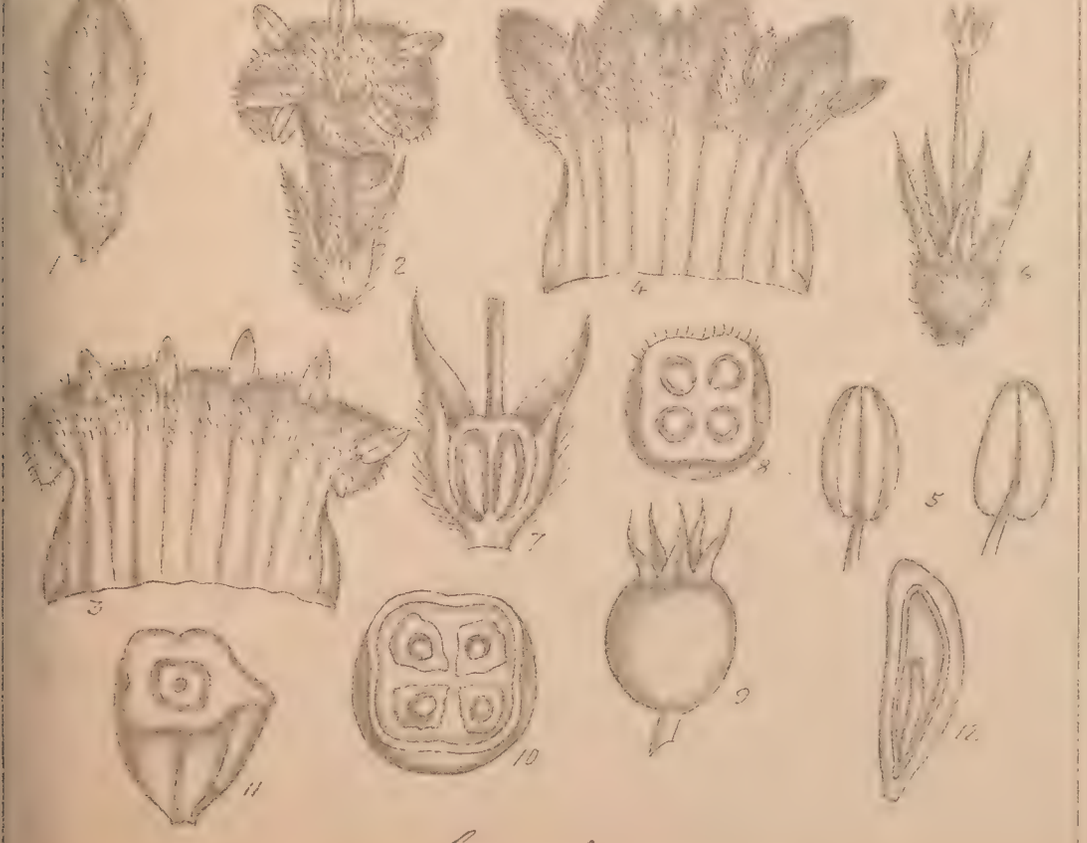
III.

Hamiltonia suaveolens

IV

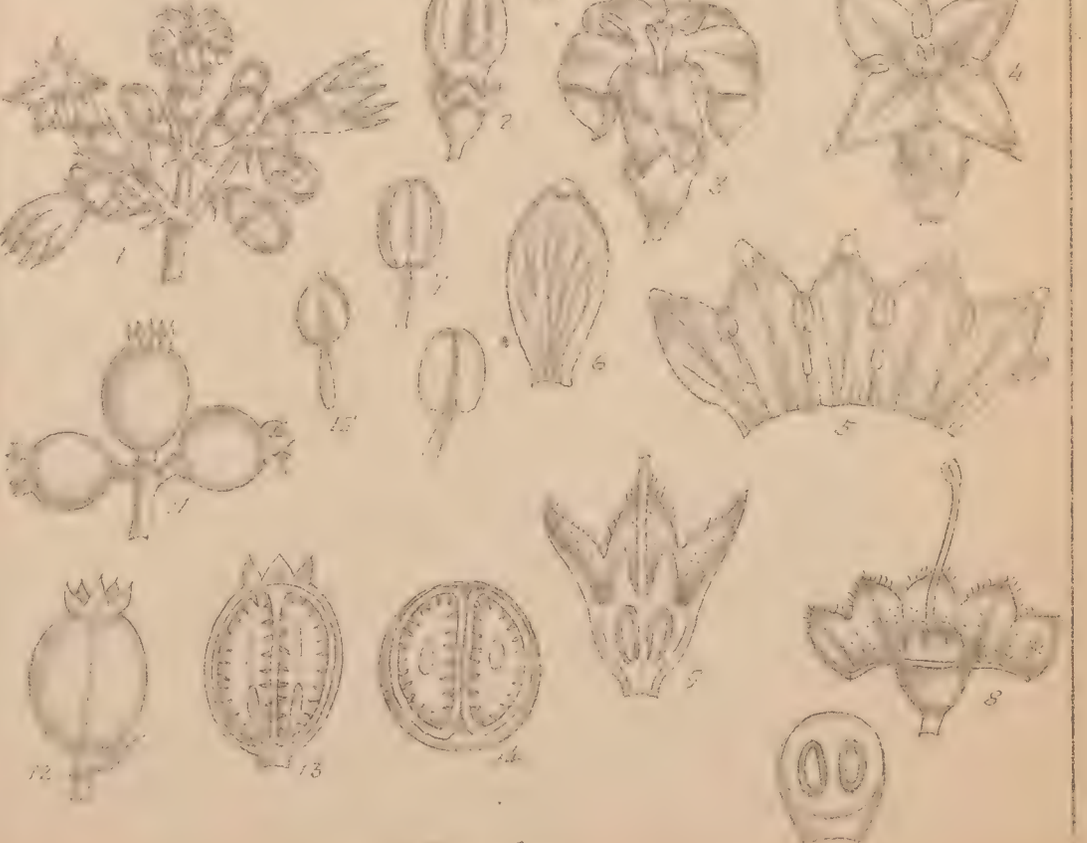
Serissa Thebaïca

V



Lasianthus venulosus

VI.



Psychotria elongata.

I.

Canarium strictum

II.

Loranthus odoratus

III.

Ardisia amplexicaulis

IV.

ORDER XLVI.—RUBIACEÆ.

Calyx-tube adnate to the ovary ; the limb entire or with as many teeth lobes or divisions as lobes of the corolla, rarely more, fewer or none. Corolla gamopetalous, inserted round the epigynous disk, lobes 4, 5 or sometimes more, rarely only 3, either imbricate (often contorted) or valvate in the bud. Stamens as many as lobes of the corolla, alternating with them and inserted in the tube, anthers various generally oblong linear 2-celled, the cells opening longitudinally or rarely by pores at the apex, fixed at the back or base or versatile. Ovary inferior, 2-or more-celled, with 1 or more ovules in each cell, rarely 1-celled with parietal placentas, or reduced to one 1-ovulate cell ; style more or less divided into as many stigmatic lobes as carpels to the gynœcium, or undivided with a thickened entire or notched stigma. Fruit a capsule, drupe, berry, or indehiscent nut. Seeds with a fleshy or horny or ruminate albumen, and rather small straight, embryo with flat cotyledons, or rarely with little or no albumen and cylindrical embryo with semiterete cotyledons. Trees, shrubs, herbs, or rarely climbers. Leaves opposite or whorled. Stipules interpetiolar, either free or connate with the petioles in a sheath bordered by cilia or leaf-like lobes, or with one or two points on each side, or connate within the petioles in a short sheath or ring round the stem. Inflorescence various, usually more or less cymose, axillary or terminal. Flowers occasionally polygamous or unisexual.

A very large order, and one of considerable importance to the forester. The old genus Nauclea yields valuable timbers ; this genus is now divided into 5, viz., Sarcocephalus yielding 1 tree common in Ceylon, but not found in the peninsula ; Anthocephalus 1 tree, India and Ceylon ; Adina 1 tree (A. cordifolia) throughout this presidency ; Stephegyne 2 trees, 1 confined to Ceylon, 1 (S. parvifolia) common throughout the dry forests of this presidency ; and Nauclea, several trees both in India and Ceylon. The genus Hymenodictyon also yields several valuable timber trees found on both sides of the Presidency.

Wendlandia, Morinda, Plectronia, (better known hitherto as Canthium) and Ixora yield timber trees of fair quality, and are found throughout the presidency. Diplospora are trees confined to our western forests and Ceylon.

Nargedia (a shrub) ; Uncaria (a creeping shrub) ; Urophyllum (2 small trees) ; Scyphostachys (2 shrubs) ; Timonius (a small tree) ; Dichilanthe (a tree) ; and Prismatomeris (2 shrubs) are genera confined to Ceylon.—Byrsophyllum, 2 small trees, one confined to Ceylon, the other to the Travancore and Tinnevelly mountains.—Mussænda, Randia, Webera, Gardenia, Pavetta, Coffea, Psychotria and Hamiltonia are generally shrubs, rarely small trees, found throughout the Presidency.

Saprosma and Lasianthus are shrubs confined to our western moist forests (1 species of the latter is found in moist localities on the higher mountains on the N. East side), and with many species of Psychotria, Pavetta and Ixora are very characteristic of these forests.

There are very few genera in Northern India which are not represented in our Peninsular flora. In Naucleæ, the genus Cephalanthus is represented by a tree on the Himalayas. In Cinchoneæ the genus Luculia yields 2 shrubs. In Gardenieæ the genera Brachytome, Petunga and Hyptianthera are represented by shrubs. In Vangurieæ the genus Vangueria (scarcely distinct from Plectronia) yields 1 shrub. The Morindeæ Damnacanthus 1 shrub, and in Pœderieæ the genus Leptodermis yields several shrubs.

Herbs and undershrubs are largely represented, particularly in our moist mountain forests.

In Hedyotideæ (a tribe not represented by trees or shrubs) the following genera occur in S. India.—Dentella, Argostemma, Neurocalyx, Hedyotis, Oldenlandia, Anotis and Ophiorhiza. And the following are confined to Northern India, Spiradiclis, Polyura, Carlemannia and Silvianthus.

In Mussændeæ, Acranthera, Leucocodon, Schizostigma and Adenosacme (Lawia, Wight) occur in South India or Ceylon, and in N. India Polysenia and Myrioneuron.

In Knoxieæ (not represented by trees or shrubs) Knoxia.

In Psychotrieæ, Chasalia, Geophila, Allœophania and Fergusonia.

In Pœderieæ, Pœderia.

In Spermacoceæ (not otherwise represented) Hydrophylax, and Spermacoce.

In Galieæ (not otherwise represented) Rubia and Galium.

In Cinchoneæ, Hymenopogon is a N. Indian genus yielding epiphytic plants.

The Coffee, Coffea Arabica and the Peruvian bark, Cinchona (various species), are introductions into this presidency, but there are numerous plantations formed of both on our mountains, the former generally between 2 and 4000 feet elevation, the latter between 3 and 8000 feet.

The Ipecacuhana Cephælis, belonging to the Psychotrieæ, has also been introduced, but without much success as yet ; it would probably answer well on the moist western slopes of the Nilgiris at 3000-4000 feet elevation.

CONSPECTUS OF THE TRIBES.

Series A.—Ovules numerous in each cell of the ovary.

* Fruit dry capsular, or with 2-4 cocci or nucamentaceous.

1. Flowers in a globose head.

   Tribe I, NAUCLEÆ. Corol narrow infundibuliform never contorted. Stigma entire much exserted.

2. Flowers not in globose heads.

   Tribe II, CINCHONEÆ. Corol valvate imbricate or contorted. Capsule 2-celled, seed winged or appendiculate, albuminous.

Tribe III, RONDELETIEÆ. Corol imbricate or contorted. Capsule 2-celled, seed very numerous albuminous, not winged.

* * Fruit fleshy splitting irregularly or dehiscing at the apex, or a drupe with 2-many pyrenes, each many-seeded.

Tribe IV, MUSSÆNDEÆ. Corol valvate. Seed numerous minute angled.

Tribe V, GARDENIEÆ. Corol much contorted. Seed numerous or few large compressed or small and angled.

Series B.—Ovules 2 in each cell collateral.

Tribe VI, RETINIPHYLLEÆ. Corol contorted, drupe with 5-7 pyrenes.

Series C.—Ovules solitary in the cells. Or sometimes twin in one genus in Morindeæ.

* Radicle superior.

Tribe VII, GUETTARDEÆ. Corol imbricate or valvate, stamens inserted in the jaws of the corol, seed with a thickened funicle, albumen none or scanty.

Tribe VIII, VANGUERIEÆ. Corol valvate, stamens inserted in the jaws of the corol. Seed albuminous.

* * Radicle inferior.

1. Corol contorted.

Tribe IX, IXOREÆ. Ovary 2-4-celled, ovules attached to the middle or below the middle of the axis, generally amphitropal or semianatropal, rarely basal.

2. Corol valvate (sub imbricate in one genus in Morindeæ.)

† Ovules attached to the partition, rarely basal, generally amphitropal.

Tribe X, MORINDEÆ. Ovary 2-4-celled.

†† Ovules basal erect anatropal.

Tribe XI, PSYCHOTRIEÆ. Stamens inserted in the jaws of the corol. Ovary 2-many-celled, stigma entire or the style-branches short, fruit indehiscent.

Tribe XII, PÆDERIEÆ. Stamens inserted in the jaws, or rarely at the base of the corol, ovary 2-5 celled, style-branches filiform, fruit capsular or with 2-cocci.

Series D.—Ovary 1-celled, ovules 1-2 pendulous.

Tribe XIII, OCTOTROPIDEÆ.

CONSPECTUS OF THE GENERA.

Tribe I.—NAUCLEÆ.

Calyx-tubes confluent, fruit syncarpous globose.
- Ovary 2-celled ..... SARCOCEPHALUS.
- Ovary 4-celled above, 2-celled below, placentas bifid above ..... ANTHOCEPHALUS.

Calyx-tubes contiguous or slightly cohering, fruit capsular.
- Corol valvate.
  - Calyx limb 5-lobed, placentas pendulous. Trees ..... ADINA.
  - Calyx cup-shaped or tubular truncate or obscurely 5-toothed, placentas pendulous. Trees. ..... STEPHEGYNE.
  - Placentas prominent attached to the partition, the ovules ascending; scandent shrubs ..... UNCARIA.
- Corol imbricate ..... NAUCLEA.

Tribe II.—CINCHONEÆ.

HYMENODYCTION.

Tribe III.—RONDELETIEÆ.

WENDLANDIA.

Tribe IV.—MUSSÆNDEÆ.

Inflorescence terminal. Corol-tube elongate ..... MUSSENDA.
Inflorescence axillary. Corol tube short ..... UROPHYLLUM.

Tribe V.—GARDENIÆ.

Flowers hermathrodite.
- Ovary 2-celled.
  - Albumen not ruminate.
    - Stamens 5 ovules imbedded in a fleshy placenta, inflorescence generally axillary ..... RANDIA.

Stamens 5-9, ovules not imbedded in the placenta, inflorescence generally terminal ... ... Webera,
Stamens 4, flowers in axillary spikes ... ... Scyphostachys,
Albumen ruminate ... ... Nargedia,
Ovary 1-celled... ... ... Gardenia.
Flowers diœcious or polygamo-diœcious.
Inflorescence terminal large, stipules large convolute deciduous ... ... Byrsophyllum,
Inflorescence axillary small, stipules not convolute .. .. Diplospora.

Tribe VI.—Retiniphylleæ.

Scyphiphora,

Tribe VII.—Guettardeæ.

Corol regularly imbricate, 2-3 lobes exterior ... ... Guettarda.
Corol valvate or subimbricate.
Corol not bilabiate, drupe with many pyrenes ... ... Timonius.
Corol bilabiate, tube curved, fruit 2-celled ... ... Dichilanthe,

Tribe VIII.—Vanguerieæ.

Plectronia,

Tribe IX.—Ixoreæ.

Style entire or the style branches erect and connivent ... ... Pavetta.
Style bifid at the top the lobes spreading or recurved.
Pyrenes plane and concave on the inner face ... ... Ixora.
Pyrenes scored with a deep furrow on the inner face. ... ... Coffea.

Tribe X.—Morindeæ.

Flowers confluent in heads, fruit syncarpous ... ... Morinda.
Flowers not confluent in heads, fruit pisiform ... ... Prismatomeris.

Tribe XI.—Psychotrieæ.

Style-branches or stigmas 2.
Corol simply valvate, stamens 5-(rarely 4-6)... ... ... Psychotria.
Corol induplicate-valvate, stamens 4 ... ... Saprosma.
Style-branches 4-9 ... ... Lasianthus.

Tribe XII.—Pæderieæ.

Hamiltonia,

Tribe XIII.—Octotropidieæ.

Octotropis.

Tribe I, Nauclea.—*Flowers numerous, densely crowded on a spherical receptacle sessile or pedicelled. Corol narrow infundibuliform the tube elongate, lobes short imbricate or valvate, anthers inserted in the mouth or jaws of the corol generally subsessile short acute or apiculate, ovary 2-celled. Style much exserted, stigma clavate fusiform or capitate, ovules numerous rarely solitary (in Cephalanthus not a South Indian genus) fruit syncarpous many-celled, or a capsule septicidally 2-valved or with 2 cocci. Seed minute winged or wingless albuminous, radicle superior.*

SARCOCEPHALUS. Afzel.

For Gen. Char. see letter-press to Pl. cccxviii.

N. B.—In description, for "seed sessile connate," &c., read *seed-vessels connate.*

1. Sarcocephalus cordatus, *Roxb.*—For description, &c. see Pl. cccxviii.

ANTHOCEPHALUS. A. Rich.

Gen. Char. Flowers compact in a globose head without bracteoles, the calyxes concrete, calyx-tube obconical, lobes 5 spathulate or oblong persistent or deciduous, corol tubuloso-infundibuliform glabrous at the jaws, the lobes 5 imbricate 1 or 2 exterior. Stamens 5 inserted into the jaws of the corol, filaments short flat, anthers ovato-oblong apiculate, disk inconspicuous, ovary 2-celled below, 4-celled above, the placenta adnate to the partition below bifid above, the divisions ascending between the cells. Style filiform exserted, stigma fusiform, ovules numerous subhorizontal anatropal, fruit syncarpous subfleshy, pyrenes numerous membranaceous at the base above 4-locellate below 2-celled, few-seeded. Seed minute ellipsoid, funicle very short, testa submembranaceous netted, albumen fleshy, embryo clavate, cotyledons short, radicle obtuse. Trees, glabrous, leaves opposite petiolate coriaceous, stipules large or elongate caducous, flower heads shortly peduncled terminal without bracts, flowers orange-colored. *A. Rich. in Mem. Soc. Hist. Nat. Par. V.* 237 ;—*Benth. et Hook. Gen. Pl. vol.* ii. *p.* 29. Nauclea Sp., *Auct.*

1. Anthocephalus Cadambus, *Roxb.*—For description, &c., see Pl. xxxv, under the name Nauclea, which should be altered to Anthocephalus. The dissection of the ovary was taken from poor dried specimens, and is not correct ; but I have no good flowers or fruit to enable me to give a better analysis of the genus.

ADINA. Salisb.

Gen. Char. Flowers compact in a globular head furnished with bracteoles, calyx-tube short, the segments 5 short or elongate persistent or deciduous sometimes alternate with 5 very short teeth or glands, corol-tube elongate glabrous within, lobes 5 short valvate rounded or ovate. Stamens 5 on short filaments inserted in the jaws just between the lobes, anthers exserted, disk cupular, ovary

2-celled, style filiform much exserted, stigma capitate or clavate, ovules numerous imbricate attached to the placenta which is pendulous from the apex of the cell, capsule septicidically 2-coccous, cocci dehiscing and often falling off and leaving a persistent axis, crowned by the star-like limb of the calyx, seed oblong, testa winged on each side, nucleus small, albumen copious, cotyledons plane, radicle terete superior. Trees or shrubs, leaves opposite petioled ovate lanceolate or cordate. Stipules large oblong obtuse caducous, flower-heads solitary or paniculate or slender generally articulated, peduncles bracteate or without bracts, receptacle pilose. Flowers small. *Salisb. Parad. Lond.* i. 115. Nauclea sp., *Auct.*

1. ADINA CORDIFOLIA, *Roxb.*—For description, &c. see Plate xxxiii, under the name of Nauclea, which should be altered to Adina.

Analysis, Pl. XXIX, fig. 2.

1. A flower and some bracts removed from the globular head calyx hairy, segments 5, their apices swollen, corol-tube hairy outside, lobes flat valvate, style very long, stigma small capitate.
2. Corol opened to show the insertion of the stamens, the tube glabrous within.
3. Calyx, ovary and style.
4. One of the bracts.
5. Anther, front and back view.
6. The 2-celled ovary cut vertically, ovules numerous imbricate on a placenta pendulous from the apex of the cell, small teeth present betwen the calyx-segments. (From dried specimens).

STEPHEGYNE. KORTH.

Gen. Char. Flowers compact in a globose head furnished with bracteoles, calyx-tube short ovoid or obconical the limb cupular or tubular truncate or obscurely 5-toothed, corol infundibular the tube elongate, the jaws glabrous or pilose, lobes 5 short acute valvate. Stamens 5 inserted into the jaws or below the apex of the corol, filaments short filiform, anthers fixed by the back lanceolate cordate at the base apiculate, disk annular, ovary 2-celled, style elongate filiform much exserted, stigma capitate mitre-shaped or cylindric, ovules numerous imbricate inserted on a placenta pendulous from the apex of the cell or attached to the partition, fruit 2-coccous, cocci dehiscing many seeded. Seed small imbricate, testa winged on both sides, nucleus minute, albumen fleshy. Trees or shrubs, leaves ovate or lanceolate, stipules large caducous, heads of flowers axillary or terminal solitary paniculate or subumbellate often 2-bracteate; flowers yellow. *Korth. Verh. Nat. Gesch.* 160, *et t.* 35. Mitragyne, *Koth. Obs. de Naucl. Ind.* 19. *Ex. Miq. Fl. Ind. Bat.* ii. 140. Nauclea, *Auct.*

1. STEPHEGYNE PARVIFOLIA, *Roxb.*—For description, &c. see Plate xxxiv. under the name of Nauclea, which should be altered to Stephegyne.

Analysis, Pl. XXIX, fig. 1.

1. Portion of a branch in fruit.
2. A single capsule removed from the head, shewing the persistent calyx-tube and the bracteoles at the base
3 & 4. Vertical and transverse sections of the young fruit which contains 2 many-seeded cocci.

2. STEPHEGYNE TUBULOSA, *Arnt.*—A small tree, leaves submembranaceous, glabrous above, minutely puberulous on the costa and veins beneath, ovate obtuse or with a short blunt acumination rounded or slightly attenuated at the base, 2-6 inches long by $1\frac{1}{2}$-3 inches broad, primary veins prominent beneath and furnished with hairy glands in the axils, veinlets minutely reticulated, petiole 4-6 lines long. Stipules large (10-11 lines long) membranaceous oval to obovate, peduncles terminal generally tern, sometimes solitary, when tern the middle one is very short, flower-heads 1-$1\frac{1}{2}$ inches in diameter furnished at the base with 2 foliaceous deciduous bracts which are like the leaves only smaller (1-$2\frac{1}{2}$ inch long). Calyx cylindric entire or subentire, bracteoles ciliate spathulate a little shorter than the calyx, corol purple, the lobes valvate very thick fleshy and triangular except at the base, anthers apiculate. Stigma long mitre-shaped hairy at the apex only. Capsules 3-4 lines long oblong many-seeded. Nauclea tubulosa, *Arnt. Thw. En. Zey. p.* 137.

Ceylon, abundant in the south of the island.

Analysis, Pl. XXIX, fig. 1.

1. A flower bud and bracts removed from a head of flowers, bracts slightly ciliate, calyx-tubular truncate and quite entire, corol lobes valvate.
2. A full flower shewing the stamens slightly exserted.
3. A corol cut open to shew the insertion of the stamens; the tube within is slightly hairy in the upper part, the lobes are very thick and fleshy and solid except towards the base.
4. One of the lobes of the corol highly magnified.
5, 6. Anthers, front and back view; they are apiculate at the apex.
7. Style and mitre-shaped stigma.
8. The 2-celled ovary cut vertically, ovules pendulous numerous imbricate.
9. The pendulous mass of ovules removed from a cell of the ovary. (All drawn from dried specimens).

NAUCLEA. LINN.

Gen. Char. Flowers compact in a globose head ebracteolate or furnished with small bracteoles, calyx-tube turbinate or obconical, limb 5-lobed or 5-partite, the lobes often appendiculate, the appendage clavate at the apex valvate and deciduous before the flower opens, rarely spathulate or subulate and persistent. Corol tubuloso-infundibuliform, the tube elongate glabrous in the jaws, the lobes imbricate often with a horn at the back below the apex. Stamens 5 inserted in the jaws or on the tube below the apex, filaments filiform short or rather elongate or wanting anthers oblong exserted. Ovary 2-celled, style elongate filiform exserted. Stigma capitate

mitre-shaped clavate or fusiform, ovules numerous fixed on a placenta which is pendulous from the apex of the cell or adnate to the partition and ascending. Fruit 2-coccous, cocci splitting into 2, many-seeded. Seed linear or obovoid imbricate, testa winged, nucleus minute, albumen fleshy, embryo clavate. Trees generally very glabrous, leaves sessile or petiolate, stipules large deciduous, flower-heads rarely bracteate solitary or paniculate, flowers sessile yellow. *Linn. Gen. n.* 223.

1. NAUCLEA ELLIPTICA, *Dalz.*—A large tree, leaves elliptic acute at both ends coriaceous glabrous and shining above, with or without glands in the axils of the primary veins beneath, 5-8 inches long by 1½-3 inches broad, primary veins rather raised and prominent beneath, 6-14 on each side, petioles 6-12 lines long sometimes with a slightly dilated wing, stipules triangular about 3 lines long foliaceous deciduous, peduncles axillary and terminal solitary 1-2½ inches long, flower-head about 1 inch in diameter, bracteoles small clavate at the apex hairy. Calyx-segments subulate ciliate and hairy, corol yellowish-white the tube wider upwards glabrous inside and out, lobes 5 imbricate slightly puberulous on both sides oval to ovate furnished with a ridge along the centre of the back which terminates in a short horn a little below the apex, anthers apiculate slightly exserted, filaments nearly as long as the anthers. Style much exserted, stigma small globose, fruit not seen. *Dalz. Bombay Flora. p.* 118.

Very common in South Canara and Malabar up to 2000 feet elevation, generally on the banks of streams, called Ahnâo ; also on the Bombay ghats. My South Canara specimens have only 6-8 primary veins and always glands in the axils ; my Bombay specimens (sent by Dalzell) have 10-14 primary veins and no glands, but I can discover no other difference. The dissections are all taken from South Canara specimens.

Analysis, Pl. XXIX, fig. 3.

1. A flower bud and bracts removed from the head of flowers, calyx-segments subulato-lanceolate hairy and ciliate, corol-tube glabrous, lobes imbricate slightly puberulous.
2. A full flower, anthers very slightly exserted, style very long, stigma small globose capitate.
3. Corol opened out to show the insertion of the stamen tube, quite glabrous within.
4, 5. Anthers, front and back view, shewing the apiculation at the apex.
6. Outside view of one of the lobes of the corol, shewing that it has a ridge down its back terminating in a short horn below the apex.
7. Calyx, ovary and style.
8. Vertical section of the 2-celled ovary, ovules numerous imbricate on a placenta which is pendulous from the apex of the cell.

2. NAUCLEA PURPUREA, *Roxb.*—A tree glabrous, stipules oval obtuse caducous, leaves petioled oval-oblong acute or acuminated at both ends smooth and shining, 4-9 inches long, peduncles terminal solitary or in threes with often 2 deciduous small leaves at the apex, partial ones about as long as the diameter of the head of flowers usually shorter than the general one, tube of the calyx glabrous, limb hirsute, segments clavate, corol purple glabrous, lobes spreading, anthers scarcely exserted, style long, stigma somewhat capitate globose, capsule valves 4 splitting from the base upwards. *Roxb. Fl. Ind. ed. Wall.* ii. 124 ;—*WA. Prod. p.* 391.

Mountainous parts of the east side of the Presidency. I have no specimens.

3. NAUCLEA PEDUNCULARIS, *Wall.*—A middling sized tree glabrous, the branches a little compressed, leaves ovato-elliptic coriaceous acuminate glabrous, peduncles terminal short stout, pedicels 3 slender 15-18 lines long, flower heads 8-9 lines in diameter, no bracteoles, calyx segments linear spatheolate rounded at the apex a little hairy, corol yellowish turning to purple, tube a little hairy towards the apex outside, and hairy within, lobes oblong hairy outside and furnished with a short horn below the apex, filaments about as long as the anthers, anthers apiculate, stigma globose sulcate, ovules about 7, placenta pendulous from nearly the apex of the partition. *Wall. cat.* 6091 ;—*Walp. Rep.* ii. 512 ;—*Thw. En. Pl. Zey. p.* 137.

Ceylon, Saffragram and contiguous districts up to 1000 feet not uncommon ; Central provinces rare.

UNCARIA. SCHREB.

Gen. Char. Flowers sessile or pedicelled laxly aggregated in a globose head, calyx-tube elongate fusiform, the limb campanulate infundibular or shortly tubular 5-lobed or 5-parted, corol tubuloso-infundibular, tube elongate glabrous in the jaws, lobes 5 valvate. Stamens 5 inserted into the jaws of the corol, filaments short, anthers oblong, 2-setose at the base, affixed at the back. Disk inconspicuous. Ovary fusiform 2-celled, style slender much exserted, stigma capitate, ovules numerous ascending inserted on a prominent placenta which is fixed to the partition, capsule elongate 2-celled septicidally 2-valved, many-seeded, seeds imbricate, nucleus small, testa with a long wing on both sides, the wing often 2-partite above, albumen fleshy, embryo clavate, cotyledons short, radicle obtuse. Scandent shrubs glabrous or tomentose, leaves opposite shortly petiolate, stipules interpetiolar entire or 2-fid, flower-heads axillary pedunculate generally solitary sometimes paniculate, the sterile peduncles often changing into hooked tendrils, flowers often tomentose or villose, yellow. *Schreb. Gen.* i. 125 ;—*Benth. & Hook. Gen. Pl. p.* 31. Ourouparia, *Aubl. Pl. Gen.* i. 177. *t.* 68. Agylophora, *Neck. Elem.* i. 145.

1. UNCARIA GAMBIER, *Hunter.*—A stout scandent shrub, leaves opposite, short petioled ovate-oblong to ovate-lanceolate entire acute smooth on both sides, about 4 inches long by 2 broad, stipules oblong caducous, tendrils axillary solitary or in opposite pairs, simple recurved hooked, peduncles axillary solitary, bracteated and jointed about the middle, supporting a single globular head of beautiful green and pink florets, bracts about the middle of the peduncle annular cup-like 3-4-cleft, calyx sericeous on the outside limb 5-cleft, corol-tube filiform, lobes 5 obtuse villous on the outside and hairy in the centre inside, filaments short, anthers large on the mouth of the tube, ovary turbinate subsessile sericeous. Style as long as the tube of the corol, stigma clavate, capsules pedicelled clavate longitudinally grooved crowned with the 5-cleft permanent calyx 2-celled 2-valved, seed numerous imbricate winged. *Roxb. Fl. Ind. ed. Wall.* ii. *p.* 126.

Ceylon, about Colombo and the Central provinces up to 3000 feet elevation, also in Malacca, Sumatra and Pulo-Penang. Gambier is the Malay name of an extract prepared from the leaves, and which is chewed by the natives with betel leaf and areca nut.

Tribe II, CINCHONEÆ.—*Corol-lobes valvate imbricate or contorted, ovary 2-celled, ovules very numerous in the cells, fruit capsular, seed numerous minute vertical or ascending, peltate imbricate, winged, albuminous, radicle generally superior. Trees or shrubs, stipules entire.*

Sub-Tribe I, EUCINCHONEÆ.—*Corol valvate.*

HYMENODICTYON. WALL.

For Gen. Char. see letter-press to Pl. ccxix.

1. HYMENODICTYON OBOVATUM, *Wall.*—For description, &c. see Pl. ccxix.

2. HYMENODICTYON EXCELSUM, *Roxb.*—A large tree, leaves opposite petioled oblong entire soft downy particularly beneath, 6-12 inches long 3-5 inches broad, stipules cordate serrate; floral leaves, the lower pair or two of the ramifications of the panicle are ornamented each with a pair of floral leaves much smaller but similar in shape to the ordinary leaves colored more permanent and bullate, petioles round downy 2-3 inches long, panicles terminal large generally with the lower branchlets cross-armed, flowers fascicled small greenish-white very fragrant, calyx 5-toothed, corol-tube long downy, limb 5-parted, lobes oval spreading, filaments 5 short free inserted into the mouth of the tube, style twice as long as the tube, stigma capitate globose, capsule oblong crowned with the remains of the calyx about as thick as a field bean, but twice as long, 4-striated marked with small white elevated specks. *Roxb. Fl. Ind.* i. 529.

Common on the eastern mountains of this Presidency and the Godavery forests, Kurnool hills, &c., called Dudippi in the Godavery jungles, Chetippa (Circars), and Mànà bira in the Kurnool district; the wood is firm, close-grained, of a pale mahogany color, and is used for gun stocks and a variety of purposes.

3. HYMENODICTYON UTILE, *Wight.*—A large tree, leaves roundish ovate abruptly acuminate, glabrous above villous beneath, stipules broad ovate obtuse glanduliferous on the margins, panicles terminal loose, branches racemose, flowers pedicelled bracteolate fascicled, corol funnel-shaped, tube about twice the length of the calyx-limb, filaments free inserted on the throat, anthers oblong apiculate subsaggitate at the base. *Wight Icones letter-press to tab.* 1159. H. obovatum, *Wight Icones tab.* 80 (not *Wall.*) H. excelsum, *WA. Prod. p.* 392 (not *Roxb.*)

A common tree in our western jungles, called Bastard-cedar at Palghaut, and much in use there in cabinet making, called Perunjoli in Tamil. I am not sure whether it is distinct from Hymenodictyon thyrsiflorum, *Roxb*, a Bengal species which I have not seen. For analysis of the flower, see figure *A* Plate ccxix.

Tribe III, RONDELETIÆ.—*Corol-lobes imbricate or contorted, ovary 2-celled, fruit capsular, seeds numerous in the cells horizontal minute not winged or rarely winged albuminous, embryo clavate or cylindric. Trees or shrubs, stipules simple rarely 2-cleft.*

WENDLANDIA. BARTL.

For Gen. Char. see letter-press to Pl. ccxxiv.

1. WENDLANDIA NOTONIANA, *Wall.*—For description, &c. see Pl. ccxxiv.

2. WENDLANDIA EXSERTA, *Roxb.*—A small tree, young branches villous, leaves broad lanceolate softly downy on both sides, 4-6 inches long, petioles short flat on the upper side, downy; stipules semilunar reflexed downy, panicles terminal large diffuse ovate, branchlets round and downy, bracts subensiform variable in size, flowers numerous pure white fragrant. Calyx hoary 5-toothed. Corol-tube short contracted at the mouth by 5 elevations on the inside, lobes 5 oblong recurved, filaments nearly as long the corol-lobes; capsule villous. Rondeletia exserta, *Roxb Fl. Ind.* i. *p.* 523, Wendlandia exserta, *WA. Prod. p.* 402.

Very common in the Orissa country and in the north-east part of this presidency, but I have never seen it in the south,

3. WENDLANDIA TINCTORIA, *Roxb.*—A small tree, young shoots 4-sided ferrugineo-tomentose, leaves opposite or verticelled in threes, oblong to lanceolate, above glabrous, beneath with a few hairs on the costa and veins, 4-6 inches long 1-2½ inches broad, petioles short somewhat winged. Stipules triangular, subulate hairy on both sides, panicles terminal large, branchlets numerous 4-sided hairy, bracts hairy those of the ultimate divisions ensiform with a hastate base and embracing 3 flowers, bracteoles small 1 to each flower, flowers very numerous small white subsessile, calyx hairy 5-toothed, corol-tube slender many times longer than the calyx, lobes ovate spreading, filaments very short inserted immediately under the fissures of the lobes; style as long as the tube, stigma 2-lobed, lobes oblong; capsule spherical minute. Rondeletia tinctoria, *Roxb. Fl. Ind. ed. Wall.* i. 134.

Common with the preceding, also in the Godavery forests, &c., but not occurring in the south of the presidency. Its bark is used by the natives as a mordant in some of their dyes.

Tribe IV, MUSSÆNDEÆ.—*Corol lobes valvate, ovary 2-many-celled, cells many ovuled, fruit indeshiscent fleshy baccate or with two many pyrenes, 2-many celled, cells many-seeded. Seed minute globose or angled very rarely compressed, testa often foveolate or reticultate, albumen fleshy; embryo minute ovoid or clavate, cotyledons very rarely broad or plane.*

MUSSÆNDA. LINN.

Gen. Char. Calyx-tube oblong or turbinate, the lobes of the limb 5 short or elongate erect patent or recurved deciduous rarely persistent, one of them often produced into a large petioled reticulately veined white or colored leaf. Corol infundibuliform the tube elongate often silky, the jaws villous, lobes 5 small often acute reduplicately valvate, the apices often twisted. Stamens 5 in-

serted in the jaws of the corol, filaments very short, anthers fixed by the back included narrow linear acute or obtuse, disk annular or terminal. Ovary 2-celled, style filiform the branches 2 linear subacute papillose within, ovules very numerous in the cells, inserted in many series on to the fleshy placentas which are peltately attached to the partition, fruit fleshy and indehiscent, rarely capsular and dry, oblong, areolate or crowned with the persistent calyx at the apex, 2-celled, many-seeded. Seed minute oblong turgid or compressed, testa coarsely foveolate, albumen fleshy. Embryo minute subcylindrical or clavate 2-fid. Shrubs, erect or climbing leaves opposite or ternately verticellate membranaceous subsessile or petiolate. Stipules interpetiolar solitary or twin free or connate generally deciduous, flowers orange or rarely white in terminal many flowered corymbs. *Linn. Gen.* 241;—*Benth. & Hook. Gen. Pl. p.* 64. Spallanzania, *DC.*

1. MUSSÆNDA FRONDOSA, *Linn.*—A large shrub, leaves oval acuminate villous or hirsute to nearly glabrous, branches and corymbs when young pubescent or more or less tomentose, calycine segments subulate 2-4 times the length of the ovary hirsute, one of them in some of the axillary flowers of the corymbs produced into a large acute pubescent or villous white leaf, corol externally hirsute. Style the length of the tube, fruit at first hairy afterwards nearly or quite glabrous obovoid. *Linn. Sp. p.* 251 ;—*WA. Prod. p.* 393. M. glabra, *Vahl.*

Common throughout this presidency and in Ceylon, Bengal, &c., the leaves are sometimes boiled and eaten as a vegetable; called in Ceylon Maassenda.

Analysis, Pl. XVI, fig. 3.

1. A full flower.
2. The same corol removed.
3. Corol opened out, the filaments adnate to the tube.
4. A calyx and style.
5. A calyx in which one of the segments is enlarged, foliaceous white and leaf-like.
6. Anthers, front and back view, filaments cut short.
7. Ovary cut transversely 2-celled, 2 bifid placentas from the centre of the axis, ovules numerous.
8. Vertical section of an ovary.

M. corymbosa, Roxb. Fl. Ind. i. 556, *is not, I think, distinct, and I believe that there is only one (variable) species in South India and Ceylon.*

UROPHYLLUM. WALL.

Gen. Char. Flowers hermathrodite or by abortion unisexual, calyx-tube turbinate globose or obconical, limb cyathiform 5-rarely 4-7-toothed persistent, corol coriaceous rotate shortly tubular or infundibuliform, tube short villous in the jaws, lobes 5 rarely 4-7 erect or patent triangular valvate. Stamens 5 (rarely 4-7) inserted in the jaws of the corol, filaments short, anthers fixed by the back linear acute included shortly bifid at the base, disk tumid annular sulcate, ovary 4-7 generally 5-celled, style short glabrous or puberulous, stigma ovoid or clavate entire or 4-7 cleft the lobes at length patent, ovules numerous in the cells crowded on the placentas which are fixed to the centre of the axis, fruit small 4-5-celled many-seeded. Seed minute subglobose, testa crustaceous foveolato-reticulate, albumen fleshy, embryo clavate 2-fid. Shrubs glabrous or strigosely pubescent, leaves opposite petioled generally oblongo-lanceolate, stipules broad or elongate, flowers small in axillary cymes or corymbs. *Wall. in Roxb. Fl. Ind. ed. Wall.* ii. 184. Axanthes, *Bl. Bijd.* 1002. Wallichia, *Reinw. ex, Blume. in Flora* 1825, 107. not *DC.*

1. UROPHYLLUM ZEYLANICUM, *Wight.*—Arboreous, ramuli terete or obscurely 4-sided glabrous, stipules minute triangular, leaves lanceolate acuminate glabrous on both sides finely reticulated with slender brownish veinlets, inflorescence cymose, cymes simple axillary usually paired, peduncles about the length of the petioles, calyx entire or slightly 5-toothed, corol rotate 5-cleft dull orange-yellow. Style almost obsolete, berry globose size of a pea. Axanthes zeylanica, *Wight Icones tab.* 1163.

Ceylon, central provinces, at an elevation of 4000-7000 feet.

Analysis, Pl. XVI, fig. 5.

1. Portion of a branch shewing leaves and flowers.
2. A flower bud, petals valvate.
3. A flower, corol removed, shewing the 5-lobed ovary and deeply 5-cleft style.
4. A full flower.
5. Corol removed and opened out.
6. Anthers, front and back view,
7. Ovary cut vertically, shewing the placentas and ovules.
8. Ovary cut transversely, 5 cells.
9. Branch in fruit.
10. A fruit.
11. A seed.

2. UROPHYLLUM ELLIPTICUM, *Wight.*—Arboreous, ramuli terete glabrous or very sparingly pubescent, leaves elliptic shortly and abruptly acuminated, glabrous above paler and villous beneath especially on the somewhat prominently reticulated veins, penniveined, stipules linear-lanceolate longer than the petioles deciduous, corymbs short subcapitate solitary or paired. Corol rotate 5-lobed dull orange-yellow, anthers apiculate. Style exceeding the disk, stigmas 5 connivent. Axanthes elliptica, *Wight Icones tab.* 1164.

Ceylon, central provinces, 4000-7000 feet elevation.

Tribe V, GARDENIEÆ.—*Corol-lobes contorted or imbricate, ovary* 1-*many-celled, cells many-or few-ovuled, fruit indehiscent fleshy baccate* 1-*many-celled, cells* 1-*many-seeded, endocarp sometimes bony or crustaceous. Seed large or more rarely small, compressed or obtusely angled, testa membranaceous coriaceous or fibroso-cartilaginous rarely bony, albumen horny or fleshy. Embryo large, cotyledons generally ample foliaceous.*

RANDIA. Linn.

Gen. Char. Calyx-tube ovoid obovoid or turbinate terete or costate, the limb often tubulose truncate rarely dentate or lobate, the lobes elongate or foliaceous persistent or deciduous. Corol infundibular campanulate or hypocrateriform short or long, the jaws glabrous or ciliate, lobes 5 rarely more, contorted, stamens 5 inserted into the jaws or mouth of the corol, filaments short or 0, anthers fixed by the back narrow linear included in the tube or exserted, disk annular, ovary 2-(rarely 3-4) celled, style glabrous or pilose, stigma clavate or fusiform entire or 2-toothed, ovules numerous in each cell rarely 2 or few attached to a fleshy peltate placenta. Fruit a berry succulent indehiscent often crowned by the calyx-limb 2-celled many-seeded. Seed generally immersed in a fleshy or pulpy placenta, testa generally adhering to the horny albumen, embryo axile, cotyledons orbicular foliaceous, radicle terete. Small trees or shrubs or creepers, unarmed or armed with axillary or supra-axillary thorns, leaves generally coriaceous obovate oblong or lanceolate. Stipules interpetiolar solitary on each side pointed, with a broad base but not united, often deciduous, flowers large or small in axillary cymes or clusters or solitary at the summit of short branches, white or yellow, rarely rose. *Linn. Gen. n.* 211. Oxyceros, *Lour. Fl. Cochin.* 150. Stylocoryne, *Cav. Ic.* iv. 45. *t.* 368. (not *WA.*) Cupia, *DC. Prod.* iv. 394. Griffithia, *WA. Prod.* 399. Ceriscus, *Gærtn. Fruct.* iii. 140. *t.* 28. Pseudixora, *Miq. Fl. Ind. Bat.* ii. 209. Gynopachys, *Blume. Bijdr.* 983.

1. Randia dumetorum, *Lam.*—A thorny ramous shrub, or in good soil a small tree, spines opposite, leaves oval somewhat obtuse cuneate at the base glabrous or when young slightly pubescent, flowers solitary terminal on the young shoots, shortly pedicelled, limb of the calyx campanulate, lobes oblong, corol hirsute on the outside fragrant, tube rather longer than the segments of the calyx furnished on the inside near the base with a ring of erect dense hairs, fruit usually globose, rarely oblong crowned with the limb of the calyx. *Lam. Ill. t.* 156. *fig.* 4 ;—*W.A. Prod p.* 397. Gardenia dumetorum, *Retz. Obs.* 2, *p.* 14. Posoqueria dumetorum, *Roxb. Fl. Ind.* i. 713. Gardenia spinosa, *Linn. Suppl. p.* 164. Ceriscus Malabaricus, *Gærtn.* i. *t.* 28. Randia longispina, *WA. Prod.* 398. Posoq. longispina, *Roxb. Fl. Ind.* i. 716.

Very common in the plains of Southern India and Ceylon, called Manga in Teligu ; it is often employed for fences and firewood. The fruit, which resembles a small yellow apple, is bruised and thrown into ponds to intoxicate fish, they are then easily captured, and it is not deemed that the effects of the fruit render them unwholesome.

Analysis, Pl. XVI., fig. 1.

7. Fruit cut vertically, shewing the numerous seeds nestling in the pulp.
8. Fruit cut transversely, 2-celled with a central placenta.
9. A seed.
10. A seed cut vertically to show the embryo.
11. An embryo.

2. Randia uliginosa, *Roxb.*—A rigid ramous small thorny tree, branches straight 4-angled, branchlets decussate horizontal terete bearing 1-4 thorns and 1-3 short pedicellate flowers at their extremities, leaves opposite or the young shoots fascicled at the extremities of the branchlets, short petioled oblong smooth shining, 2-3 inches long by 1½ inch broad, flowers large white and fragrant, limb of the calyx tubular bluntly 5-toothed or nearly quite entire a little shorter than the tube of the corol, corol villous in the mouth, border flat 5-8 lobed nearly 2 inches in diameter, lobes orbicular, fruit 2-celled size and shape of a pullet's egg, rind greyish. Seeds numerous oval flattened. Posoqueria uliginosa, *Roxb. Fl. Ind.* i. 712. Randia, *WA. Prod. p.* 398.

Very common in many parts of the plains in this presidency and in Ceylon, generally in swampy places, or banks of rivers, also on the mountains up to 3000 feet. In Ceylon the unripe fruit is used as a vegetable. In Teligu it is called Nalla Kákisha ; the wood is hard and close grained and suitable for turnery purposes.

Analysis, Pl. XVI, fig. 1.

1. A flower bud, corol lobes 6, much contorted.
2. A full flower, corol lobes 5 (they vary from 5 to 8), stamens sessile inserted between the lobes.
3. Front, back and side views of the anthers.
4. A flower, corol removed.
5. The ovary cut vertically, ovules numerous attached to a central placenta.
6. Ovary cut transversely, cells 2.

3. Randia fragrans, *Kœn.*—A rigid glabrous armed shrub, thorns opposite or sometimes absent (when in rich soil), leaves 2-3 inches long by 1½ inches broad short petioled obovate to oblong cuneate at the base coriaceous, with concave glands that are hairy on the margin in the axils of the veins, stipules interpetiolar solitary on each side, distinct roundish-ovate with a cuspidate point caducous, flowers white pedicelled on a nearly simple very short peduncled umbel-like corymb at the ends of the branches, or on short lateral knobs or leafless young shoots, pedicels bibracteolate near the base, calyx-tube obovate short, limb 5-toothed, segments acute deciduous, corol infundibuliform hairy in the throat, lobes 5 spreading narrow-oblong acute. Stamens 5, anthers long linear acuminated exserted attached by their back a little above their base to the mouth of the tube of the corol, the filaments scarcely any. Style filiform the length of the tube of the corol, stigma entire long fusiform striated exserted, berry globose the size of a large pea or a little larger, red when ripe, marked on the apex with a circular scar, 8-10 seeds in each cell, seeds angled nestling in pulp. Posoqueria fragrans, *Kœn. MS. in Roxb. Fl. Ind.* i. 717. Griffithia, *WA. Prod. p.* 400. Randia Malabarica, *Lam.* Stylocoryne Pandaki, *DC.* iv. 377.

A very common shrub in many parts of this presidency, in use as a hedge plant, also in Ceylon up to 3000 feet elevation.

4. Randia Gardneri, *Thw.*—A small elegant tree up to 20 feet high unarmed, ramuli terete a little compressed, leaves glabrous shining lanceolate acuminate narrowed at the base, 2-4½ inches long by ¾-1½ inch broad, petiole 2-3 lines long, corymbs

axillary shorter than the leaves shortly pedunculate sparingly pilose at length glabrous, pedicels rather elongate, bracteoles small, flowers yellow, calyx minutely 5-toothed externally pilose, corol externally subglabrous, internally pilose at the jaws, tube 2 lines long, lobes linear-lanceolate 4 lines long, placentas with 8-12 ovules, berry subspherical 4-5 lines in diameter. Griffithia Gardneri, *Thw. En. Pl. Zey. p.* 158;—*Bedd. Icones Pl. tab.* xxxviii.

South Tinnevelly mountains, Ceylon 2000-4000 feet elevation.

5. Randia rugulosa, *Thw.*—A shrub, the young branches pilose, leaves rugulose ovate or ovato-lanceolate shortly acuminate, pilose beneath on the veins at length glabrous, 2-5 inches long by 1-3 inches broad, petioles 2-3 lines long, stipules rotundate cuspidate glandulose within at the base, corymbs adpressedly pilose leaf-opposed in the axis of a small abortive spine-like leaf, calycine teeth short subulate, berry globose as large as a pea. Griffithia rugulosa, *Thw. En. Pl. Zey. p.* 159.

Ceylon, Ambagamwa, Saffragam and Galle districts.

6. Randia speciosa, *Bedd.*—Scandent, unarmed, branches terete, slightly hairy at the joints under the stipules ; leaves glabrous shining broad ovato-lanceolate up to 10 inches long by 4 broad, acuminate, attenuated at the base, petioles nearly 1 inch long ; stipules triangular glabrous caducus, corymbs leaf opposed (alternate with pairs of leaves) much shorter than the leaves, peduncles up to ½ an inch long, pedicels elongate bracteolate at the base, calyx truncated and with the peduncles and pedicels slightly pilose (splitting like a spathe) furnished with 5 small teeth at the apex, corol glabrous outside, hairy in the jaws, cream colored, up to 1½ inch in diameter, anthers subsessile, stigma clavate muriculate ; berry subglobose, 6-8 lines in diameter. *Bedd. Icones Pl. Ind. tab.* xxxvii.

A very handsome creeping shrub common on the west slopes of the Nilgiris, Coorg, Canara, Travancore, &c., the flowers are very fragrant.

7. Randia Deccanensis, *Bedd.*—An unarmed tree, 30 feet high, young shoots tomentose, leaves broadly-ovate rhomboid-ovate or almost orbicular obtuse or emarginate scarcely coriaceous, above glabrous or subglabrous in age beneath densely velvetty, 3-4 inches long by 2-4 broad, petioles ½-1 inch long, cymes axillary or from the old axils a little shorter than the leaves subglabrous rather loose, the branchlets 3-flowered, flowers 5-merous white 6 lines in expansion, calyx cup-shaped the teeth small acute, corol hairy outside, tube scarcely as long as the lobes hairy in the jaws, lobes rounded. Stamens exserted quite sessile, style linear, stigma scarcely exserted globular entire ; ovary cells 5-ovuled, fruit not seen. *Bedd. Icones Pl. Ind. Or. tab.* ccxxxvii.

Nallaymallay mountains, Kurnool.

WEBERA. Schreb.

Gen. Char. Calyx-tube obovoid or turbinate, limb small shortly tubulose and 5-cleft or 5-parted deciduous or rarely persistent, corol infundibular or salver-shaped, the tube short or elongate glabrous or villous in the jaws, the lobes 5 longer or shorter than the tube, narrow patent or reflexed much contorted. Stamens 5 inserted into the mouth of the corol, filaments short or 0. Anthers fixed by their back narrow linear often acute ; ovary 2-celled, style glabrous or pilose elongate, stigma fusiform sulcate thick or slender often much exserted, ovules numerous in the cells rarely 2 or solitary, placentas fleshy peltately affixed to the partition, berry pisiform coriaceous or fleshy 2-celled, cells 1-few-many-seeded, seed angled suborbicular, testa membranaceous coriaceous or crustaceous, albumen fleshy or cartilaginous, embryo small, cotyledons small flat foliaceous, radicle terete excursive or inferior or next the hilum. Trees or shrubs glabrous or pubescent, leaves oblongo-lanceolate, flowers in terminal many flowered corymbs. *Schreb. Gen.* 794. Stylocoryne, *WA. Prod.* 400 not *Cav.* Tarenna, *Gærtn. Fr.* i. 139. *t.* 28. Ceriscus, *Nees.* Wahlenbergia, *Bl.* Chomelia, *Linn. Gen. ed.* i. 55.

This genus differs from Randia chiefly in its terminal inflorescence.

1. Webera Asiatica, *Linn.*—A glabrous unarmed shrub, young shoots gummy, leaves lanceolate-oblong shining, 6-7 inches long by 2½ inches broad, corymbs trichotomous terminal, calyx-limb 5-cleft, corol-tube short slightly widened and bearded at the mouth white and rather fragrant, lobes oblong recurved villous at the base along the middle, style slightly hairy, stigma 10-sulcate the sulcations wing-like, ovary cells 2-many ovuled, berry the size of a large pea smooth shining black. Seeds 2-8 in each cell. Rondeletia Asiatica, *Linn. Sp. p.* 244. Stylocoryne Webera, *A. Rich. in Mem. Soc. Hist. Nat. Par.* 5 *p.* 248. Webera corymbosa, *Willd. Sp.* i. 1224 ;—*Roxb. Fl. Ind. ed. Carey. vol.* 2. 533.

A rather large shrub common throughout the presidency and in Ceylon. Stylocoryne rigida, *Wight Icones tab.* 1064, is, I believe, only a mountain form of it, at least I can find nothing of really specific distinction in my numerous specimens.

Analysis, Pl. XVI, fig. 2.

1. A flower bud, the corol lobes contorted.
2. A full flower.
3. Corol opened to show the insertion of the stamens.
4. The flower, corol removed to show the style and stigma, the latter is generally 10-sulcate, the sulcations wing like; this is not correctly shewn in the plate.
5. Anther, back view.
6. Anther, front view.
7. Ovary cut vertically, 2 collateral ovules in each cell.
8. Ovary cut transversely, shewing 2 cells each with 2 ovules (the ovules are sometimes numerous in each cell.)
9. A fruit.
10. The same cut vertically.
11. The same cut transversely, 2 cells, each cell with 2 seeds (sometimes 4-8 seeds are present.)
12. A seed.
13. A seed cut vertically, shewing the embryo.

14, 15, 16, 17. These are views of flowers with much swollen ovaries, several of which are generally to be found in each corymb ; and on cutting the ovary it is found to be hollow and has the appearance of having been attacked by insects whilst young ; the style of these flowers is shorter than in the others.

2. Webrea monosperma, *WA.*—Shrubby glabrous, leaves lanceolate-oblong shining, about 5-6 inches long by 1¾ inch broad. Corymbs trichotomous with rather few flowers terminal, calyx limb cupulate minutely 5-toothed, tube of corol infundibuliform many times longer than the calyx (about 10 lines in length) pubescent on the inside, lobes oblong glabrous about ½ as long as the tube, ovary with 2-3 ovules in each cell, style slightly hairy, stigma acute compressed with a furrow along each side, berry white and about as large as a small cherry fleshy 1-celled 1-seeded. Seed not angled. Stylocoryne monosperma, *WA. Prod. p.* 401 ;—*Wight Icones tab.* 317.

I do not know this plant, and the figure in White's *Icones* has more the appearance of a Pavetta, and is very like one that I have from the northern slopes of the Nilgiris and Peria peak in Wynaad, but it cannot belong to that genus if it is correctly described as having 2-3 ovules on each cell,

SCYPHOSTACHYS. Thw.

Gen. Char. Calyx-tube short hemispherical, the limb produced beyond the ovary and unequally 4-cleft, the segments persistent, corol shortly tubulose, villous in the jaws, lobes 4 short recurved contorted. Stamens 4 sessile or subsessile, anthers fixed by the back above the base included oblong, disk tumid, ovary 2-celled. Style short its branches 2 short pilose ; ovules about 4 in each cell, the placenta adnate to the centre of the axis, berry ovoid or narrow oblong areolate at the apex 2-celled few-seeded. Seed large pendulous ovoid, testa coriaceous sulcate, albumen fleshy, embryo small, excentric, cotyledons small, radicle terete. Shrubs, erect ; leaves lanceolate or oblong, coriaceous. Stipules interpetiolar connate at the base acuminate, pendulous axillary or supra axillary few flowered, bracteoles large connate sheathing, flowers small sessile. *Thw. En. Pl. Zey. p.* 157.

1. Scyphostachys coffeoides, *Thw.*—A shrub, leaves lanceolate much attenuated at both ends acuminate at the apex, glabrous subcoriaceous, 2½-5 inches long by ¾-1¾ inch broad, petiole 1-2 lines long, stipules entire at the margins glabrous inside subscariose, peduncle very short or wanting, flower solitary at first almost quite enclosed in the large sheathing subscariose bracteole, fruit a red berry, seed oblong striated about 2 lines long. *Thw. l. c.*

Ceylon, Ratnapoora district, abundant but up to no elevation ; called Wal-copee.

Analysis, Pl. XVI, fig. 6.

1. Portion of a branch in flower.
2. A flower.
3. A flower, corol removed, shewing the tumid disk.
4. Corol removed and opened out.
5, 6. Anthers, front and back view.
7. Ovary cut vertically.
8. Ovary cut transversely.
9. A fruit.
10. A fruit cut vertically.
11, 12. The placentas with the ovules attached removed from the ovary.
13. A seed.
14. A seed cut vertically, the embryo small excentric lying in fleshy albumen, radicle terete. (From a drawing by Dr. Thwaites.)

2. Scyphostachys pedunculatus, *Thw.*—A shrub, branches rather scabrous, leaves glabrous except the costa beneath which is hairy oblong with a longish acumination at the apex, 3-6 inches long by ¾-2¼ inches broad. Stipules triangulari-ovate from a very broad base cuspidate striated fimbriate at the margin and pilose on the inside, petiole 2 lines long, peduncle axillary solitary 4-6 lines long deflexed (except when very young) few flowered, bracteoles about 5-8 striate cuspidate pilose within and at the margins much imbricate and forming a short dense spike about 6 lines long at the apex of the peduncle. Corol externally pilose, berry ovoid 7 lines long black-purple generally 1-seeded. Seed linear-oblong about 4 lines long. *Thw. l. c.*

Ceylon, Pasdoon Corle, at no elevation.

GARDENIA. Linn.

Gen. Char. Calyx-tube ovoid or obconical, the limb various tubulose spathaceous lobate or partite generally persistent. Corol salver-shaped, campanulate or funnel-shaped much exceeding the calyx-tube generally glabrous in the jaws, lobes 5-9 or rarely 11 patent or recurved short or elongate contorted. Stamens equal in number to the corol-lobes and inserted between them in the jaws, filaments none or very short, anthers fixed by the back linear-oblong acute or obtuse included or shortly exserted, disk various generally annular or conical. Ovary 1-celled incompletely divided by 2-3-5 projecting parietal placentas with several ovules to each placenta. Style thick the apex clavate or fusiform terete or sulcate the apex entire or 2-3-fid, lobes stigmatose within, fruit sessile oblong ovoid cylindrical or pyriform terete or costate coriaceous or fleshy or irregularly ruptured or with a hardened 2-5 valved endocarp. Seeds numerous immersed in the fleshy or pulpy placentas, compressed or turgid, testa coriaceous or membranaceous, albumen generally horny, embryo of middling size, cotyledons broad foliaceous, radicle terete close to the hilum. Trees or shrubs, the young shoots often exuding a resinous gum, stipules solitary on each side entire more or less connate round the stem within the petioles and often very deciduous. Flowers usually rather large solitary or 3 together terminal, or axillary by the non-development of the flowering branch. *Linn. Gen. n.* 296.

1. Gardenia lucida, *Roxb.*—A small tree or large shrub, unarmed, buds resinous, leaves very short petioled oblong oval or obovate obtuse or with a short blunt point glabrous hard shining, about 6 inches long by 3 inches broad, with simple parallel veins and connecting veinlets, flowers somewhat terminal solitary, pedicels ½ to 1 inch long. Calyx-segments 5 long subulate more or less hairy particularly inside. Corol hypocrateriform, tube long (about 1½ inch) glabrous or slightly hairy striated, lobes 5 obovate-oblong generally a little shorter than the tube glabrous. Anthers sessile, stigma entire, ovary with 2 parietal placentas, ovules numer-

ous, berry drupaceous even oblong, as large as a pigeon's egg crowned with the whole limb of the calyx, nut very hard thick and bony with 2 parietal receptacles. *Roxb. Fl. Ind.* i. 707.

Found throughout the presidency, particularly abundant on the mountains on the east side and the centre of the peninsula; called Tella-manga in the Circars, and Karinga in the Godavery forests; the wood is close grained and valuable for the lathe.

Analysis, Pl. XV, fig. 6.

1. A flower bud shewing the long subulate calycine segments and the contorted æstivation of the corol.
2. A full flower smaller than usual, tube hairy (it is sometimes glabrous), lobes glabrous.
3. Portion of the tube of the corol opened to show the insertion of the stamens.
4. Stamens, front and back view (quite sessile.)
5. Calyx opened to show ovary, style and stigma.
6. Ovary cut transversely, shewing the 2 partietal placentas and numerous ovules.
7. A very young fruit. (All drawn from fresh specimens.)

2. GARDENIA GUMMIFERA, *L.*—A small tree or large shrub unarmed, buds resinous, leaves sessile narrow elliptic oblong to ovato-oblong obtuse or very shortly and bluntly pointed, puberulous and slightly scabrous when young afterwards shining, veins simple parellel, flowers terminal, 1-3 together almost sessile, calyx densely puberulous and slightly scabrous, segments short ovate acuminate. Corol hypocrateriform, tube long slender widened at the mouth sparingly pubescent; lobes 5 narrow oblong more than half the length of the tube almost glabrous, stigma clavate entire striated, berry drupaceous even oblong crowned with the whole limb of the calyx. Nut with 4-5 parietal receptacles. *Linn. F. Supp. p.* 164. G. arborea, *Roxb. Fl. Ind.* i. 708.

Found in similar localities to the last, from which it chiefly differs in its calyx.

3. GARDENIA LATIFOLIA, *Ait.*—A small tree or large shrub unarmed, leaves opposite or verticelled in threes very shortly petioled, oval to obovate glabrous with a small hairy gland in the axils of the veins on the under side; 6-8 inches long by about 3 inches broad, flowers terminal solitary, pedicels scarcely 1 line long; calyx campanulate, segments or teeth very irregular hirsute on the inside. Corol hypocrateriform, tube long (about 2 inches) hirsute on the outside, lobes about 9 obliquely obovate about $\frac{1}{2}$ as long as the tube hirsute towards the outer margin on the outside. Stigma clavate thick and fleshy bipartite, segments bifid, berry even nearly globose 15-16 lines each way crowned with the whole limb of the calyx. Nut thin brittle and bony with 4 parietal placentas. *Ait. Hort. Kew* i. *p.* 294;—*WA. Prod. p.* 395;—*Wight Icones tab.* 759.

Kurnool district, Coimbatore district, and southern districts of the presidency, ascending the mountains to 3500 feet, called Pedda Karingà in Teligu, also in Ceylon near Colombo.—Gardenia enneandra, *Koen.* (G. latifolia, *Roxb. Fl. Ind.* i. 706, differs in its description by the flowers being sometimes 3-4 together and the corol lobes being sometimes 11, but I suspect it is the same as this species; if not, I have never met with it.)

4. GARDENIA TURGIDA, *Roxb.*—A small armed tree or large shrub with swollen mealy bark. Spines opposite above the axils and terminal, leaves glabrous subsessile obovate entire 1-4 inches long by 1-3 broad. Stipules acute, flowers axillary or lateral solitary or twin subsessile large white fragrant, calyx short cylindric smooth with 5 small teeth; corol-tube many times longer than the calyx somewhat gibbous, lobes 5 spreading at length revolute obliquely oblong, anthers sessile the apices scarcely exserted, ovary with 4-5 parietal placentas. Style short, stigma clavate 5-grooved only slightly exserted. *Roxb. Fl. Ind. ed. Carey.* ii. 557.

Not uncommon on the mountainous tracts at the north-east and central parts of the peninsula.

Analysis, Pl. XV, fig. 6.

8. Transverse section of the fruit (copied from Roxburgh's drawing) shewing the 5 partietal placentas and numerous seeds.

5. GARDENIA MONTANA, *Roxb.*—A small tree with short rigid spines; bark white soft and spongy, leaves opposite or fascicled oblong obtuse nearly sessile margin revolute, glabrous and shining above, a little downy underneath, about 3 inches long by 2 inches broad, stipules annular membranaceous, flowers 3-6 fascicled at the ends of the leafless shoots, pretty large fragrant white turning to yellow very short pedicelled, calyx small with 5 teeth; corol-tube short gibbous, throat smooth, lobes 5-7 wedge-shaped marginate, anthers sessile included: stigma bifid slightly exserted, berry drupaceous roundish the size of a pullet's egg scabrous ash-colored; nut hard and bony with 4-6 parietal placentas. *Roxb. Fl. Ind.* i. 709;—*Wight Icones tab.* 577.

Common on the hills in the eastern and central parts of the peninsula, called Teligà in the Godavery forests; wood close grained and very hard.

Gardenia florida, common in our gardens, is an introduction from China.

NARGEDIA. BEDD.

Gen. Char. Flowers 4-5 merous, calyx-tube short obovate, limb with very short irregular lobes, corol-tube cylindric short hairy within, lobes rounded spreading contorted in the bud. Anthers linear sessile attached by the back just below the middle exserted, disk cushion-like, ovary 2-celled, ovules 4 in each cell pendulous, style thick, stigma large oblong exserted 2-parted or 2-sulcate, the segments erect and connivent, berry oblong $\frac{1}{2}$ an inch long, 1-celled few seeded, seed more or less compressed, albumen ruminate, cotyledons ovate, radicle long cylindric. A shrub glabrous unarmed, leaves lanceolate acuminate short petioled, stipules triangular acuminate persistent, flowers small axillary, in few flowered fascicles, or solitary. Hyptianthera, *Thw. En. Zey. p.* 157, not *WA. Prod.*—*Benth. and Hook. Gen. Pl. vol.* ii. *p.* 94, under Hyptianthera (not named.)

Perhaps only a sub-genus or section of Hyptianthera.

NARGEDIA MACROCARPA, *Thw.*—A shrub 8-10 feet high, leaves lanceolate or elliptic, 5-8 inches long $1\frac{1}{2}$-$2\frac{1}{2}$ inches broad rather coriaceous, petioles about $\frac{1}{2}$ inch long, pedicels a little shorter than or about equalling the petioles, calycine segments very short rotundate apiculate, corol-tube 2 lines long, the lobes pilose about the middle, style and stigma slightly hairy. Hyptianthera macrocarpa, *Thw. l. c.*

Ceylon; Ambagamwa, and between Galle and Ratnapoora, (the generic name is an anagram on Gardenia.) Plate cccxxviii.

Analysis.

1. A flower, anthers and stigma exserted.
2. A pentamerous corol opened, the tube and lobes slightly hairy inside, anthers sessile.
3. A tetramerous corol opened.
4, 5. Anthers, front and side view.
6. Calyx, style and stigma.
7. Vertical section of the ovary, disk and calyx, ovules pendulous superposed, disk cushion-like, calyx segments very short rounded apiculate.
8. Transverse section of the ovary.
9, 10, 11, 12. Fruit, seed and embryo. (All except Nos. 3 and 9 from the pencil of Dr. Thwaites.)

BYRSOPHYLLUM. HOOK. F.

Gen. Char. Flowers polygamo-diæcious or diæcious, calyx-tube hemispherical obsolete in the male flower, limb short cupular entire or denticulate persistent. Corol coriaceous, tube elongate the jaws campanulate, the mouth constricted villous, lobes 4-6 patent oblong obtuse contorted. Stamens as many as corol lobes and alternate with them inserted into the jaws of the corol, anthers sessile affixed at the back linear-oblong apiculate included, disk annular; ovary 2-celled, style filiform, stigma fusiform or the style-branches cohering, ovules numerous in the cells immersed in the fleshy placenta which is adnate to the partition, berry ovoid or globose furnished with a rind, 2-celled many-seeded, seed flattish numerous, immersed in the pulp. Small trees unarmed very glabrous, leaves very coriaceous turning black in drying, stipules interpetiolar large oblong acute convolute deciduous, flowers large white or rose, the male in few flowered terminal corymbs, bracteoles present, the fertile solitary terminal, berry large, about an inch or a little more each way. *Benth. & Hook. Gen. Pl. p.* 83.

1. BYRSOPHYLLUM TETRANDRUM, *Bedd.*—A small glabrous unarmed tree, polygamo-diæcious, leaves coriaceous oblong slightly attenuated at the base, quite rounded at the apex, dark green and shining above and prominently veined, pale beneath and veins inconspicuous, 2-5 inches long 1-2 inches broad, petioles $\frac{1}{2}$-1 inch long, stipules large convolute, fertile flowers solitary, the male in few flowered corymbs, pedicels bracteolate, calyx limb subentire, flowers white tinged with rose, corol-lobes 4 hairy in the jaws and inside the tube in the upper portion, stigma clavate entire, fruit size of a large cherry globose smooth. Gardenia tetrandra, *Bedd. Icones Pl. Ind. Or. tab.* xx. See Plate cccxxvi.

Travancore, Attraymallay, 5000 feet; Muti Kuli-vayal, 4500-5000 feet, in flower in May.

Analysis.

1. A branch of the male tree in flower.
2. A branch of the hermathrodite tree in flower.
3. Apex of a young branch shewing stipules.
4. A male flower, corol lobes contorted.
5. Male calyx cut open, no ovary.
6. Corol cut open, tube hairy in the jaws and within, lobes 4, stamens 4 subsessile, style and stigma.
7. Hermathrodite flower, calyx-limb subentire, corol-tube shorter than in the male.
8. Corol opened out, the same as in the male but with a shorter tube.
9. Ovary, style and stigma.
10. The apiculate anthers, front and back view.
11. Vertical section of ovary 2-celled, ovules numerous imbricate.
12. Fruit not quite mature.
13. Transverse sections of ripe fruit, small membranaceous partitions project a little from the walls of the fruit and partly divide the seeds.
14. A seed. (Drawn from dried specimens.)
15. See next species.

2. BYRSOPHYLLUM ELLIPTICUM, *Thw.*—A small tree, 10-12 feet, very glabrous, leaves coriaceous, elliptic or oblong with a short blunt acumen, 4-10 inches long by 2-3 inches broad, petiole $\frac{1}{2}$-$1\frac{1}{2}$ inches long, stipules large oblong acute convolute. *Male* peduncles tern, pedicels tern much shorter than the leaf, bracteoles few small squamæform about the base of the pedicels, calyx tube 1 line long, limb entire or minutely denticulate, corol white, tube 1 inch long pilose within towards the apex, lobes 5 oblong obtuse $\frac{1}{2}$ as long as the tube, anthers sessile linear apiculate included attached at the centre of the back, style shorter than the tube subclavate, stigma-lobes narrow cohering, ovary entirely wanting, fertile flower not known. Coffea elliptica, *Thw. En. Pl. Zey. p.* 154. Stylocoryne, *Thw. l. c. p.* 421.

Ceylon, Hinidoon, at no great elevation.

Analysis, see Pl. cccxxvi.

Fig. 15, Male flower and bud, corol lobes and stamens 5.

Corrado del

Bampin... sc.

Nargedia macrocarpa (Hook.)

Soc. Mangeot... Bruxelles

Govindo del:

Dumphry Lith:

Byrsophyllum tetrandrum: (Bedd:)

See Manual under Rubiaceæ.

DIPLOSPORA. DC.

Gen. Char. Flowers generally polygamo-diæcious, sometimes calyculate. Calyx-tube short obconical or hemispherical the limb truncate or 4-5-toothed or-lobed, the segments persistent or deciduous, corol salver-shaped or funnel shaped, tube short the jaws glabrous or villous, the lobes 4-5 spreading short or subelongate contorted, stamens as many as the corol lobes inserted into their jaws, filaments thick short or elongate, anthers subbasifixed exserted oblong or rarely linear subulate obtuse or acute often recurved, disk tumid, ovary 2-very rarely 3-celled, style short or elongate glabrous or hirsute the branches oblong or linear, ovules 2-8 in each cell inserted on a placenta adnate to the centre of the partition collateral or in 2-series, berry ovoid or globose 2-celled, cells several seeded. Seed imbricate variously compressed and angled, testa celluloso-coriaceous or membranaceous, albumen fleshy, embryo small, cotyledons orbicular, radicle terete elongate. Trees or shrubs, glabrous or sparingly puberulous, flowers small green or whitish inconspicuous axillary fascicled or in cymes, bracts sometimes involucellate. *DC. Prod.* iv. 477 ;—*Benth. & Hook. Gen. Pl.* ii. *p.* 96. Discospermum, *Dalz. in Hook. Kew Journ.* ii. 257.

1. Diplospora apiocarpa, *Dalz.*—For description, &c. see Plate ccxxiii.

In the description, between the words *substance* and *glabrous*, insert *Corol.*

I am not quite sure that this is Mr. Dalzell's species, as the frut is quite globose, the flowers are fully 6 lines in length.

2. Diplospora shpærocarpa, *Dalz. l. c.* ?—Leaves 3-4 inches long by 1½-2 inches broad shining above otherwise like the preceding but with smaller flowers and the calyx deeply 4-lobed. Discospermum Dalzellii, *Thw. En. Pl. Zey. p.* 158.

Tinnevelly ghats and in Ceylon 1000-3000 feet elevation. My Tinnevelly specimens quite correspond with specimens sent by Dr. Thwaites under the name of Discospermum Dalzellii ; if it is Dalzell's plant it also occurs on the Bombay ghats.

3. Diplospora erythrospora, *Thw.*—A tree, polygamo-diæcious, leaves 2-5 inches long, 1-2½ inches broad, petiole 1½-3 lines long. Calyx campanulate minutely 4-toothed, flowers yellowish-white, stamens rather long, ovary cells 3-4 ovulate, ovules irregularly inserted in 2 series, berry small (4 lines in diameter) ovoid or subspherical, seeds 3 lines long oblong, testa rather thick fibrous reddish-glandulose. Discospermum, *Thw. En. Pl. Zey. p.* 158.

Ceylon, Ambagamwa district, at an elevation of 3000 feet.

Tribe VI, Retiniphylleæ.—*Corol contorted ; ovary 5-7-celled, cells 2-ovuled, drupe with 5-7 one-seeded pyrenes.*

SCYPHIPHORA. Gærtn.

Gen. Char. Calyx-tube elongato-obconical, limb cupular truncate minutely 4-5 toothed persistent. Corol-tube cylindrical, pilose in the jaws, lobes 4-5 oblong patent or recurved contorted. Stamens as many as the corol lobes and inserted between them, filaments short subulate, anthers fixed below the middle of the back, linear saggittate, disk annular lobate, ovary 2-celled (but each cell divided by a spurious dissepiment into 2 superposed ones), cells narrow, style filiform, the branches linear obtuse. Ovules 2 in each cell inserted at the middle of the partition, the upper one erect, the lower pendulous ; drupe oblongo-cylindric 10-sulcate with 2 pyrenes which are scarcely separable each with 2 superposed one-seeded cells or fewer by abortion, seed oblongo-cylindric a little curved, testa membranaceous, albumen scanty, cotyledons oblong, radicle long. A glabrous shrub, stipules interpetiolar broad and short, flowers small in pedunculate axillary cymes. Epithinia, *Jack.*

1. Scyphiphora hydrophylacea, *Gærtn.*—A shrub quite glabrous, young shoots resinous, leaves obovate very obtuse narrowed into a rather long petiole, 1½-2¾ inches long coriaceous smooth and shining ; cymes dense very shortly pedunculate ; corol-tube 1½-2 lines long, lobes rather obtuse, drupe oblong crowned with the calyx-limb 3-4 lines long. *Gærtn. Fruct.* iii. 91. *t.* 196. Epithinia Malayana, *Jack* ;—*WA. Prod.* 424.

Ceylon, Jaffna, tidal back-waters, also in Australia and the Malay Peninsula, but I am not aware that it has been found on the coasts of this presidency.

Analysis, Pl. XXIX, fig. 5.

(Under the name of Scyph. Malayana, which should be altered as above.)

1. Portion of a branch in flower.
2. A flower bud, calyx truncate minutely toothed, corol lobes contorted.
3. A flower, corol-lobes 5.
4. Corol opened out hairy in the jaws, corol-lobes 4, stamens 4 between the lobes (sometimes lobes and stamens 5.)
5. Anthers, front and back view, a long apiculation at the apex.
6. Ovary, style and stigma.
7. The 10-ribbed oblong cylindric drupe much magnified ; it contains 2 pyrenes. (Drawn from dried specimens.)

Tribe VII, Guettardeæ.—*Corol-lobes imbricate or valvate never contorted. Stamens inserted in the jaws of the corol, ovary 2-many-celled, ovules solitary anatropal pendulous from the apex of the cell, funicle thickened, raphe dorsal with a superior micropyle ; drupe with 2-many-pyrenes or the putamen 2 many-celled rarely with 2 cocci, seed terete pendulous from the apex of the cell, the funicle closing the orifice of the cell, albumen 0 or scanty, embryo elongate cylindric, radicle superior. Trees or shrubs, inflorescence axillary.*

GUETTARDA. Linn.

Gen. Char. Calyx-limb truncate or irregularly toothed. Corolla-tube cylindrical, lobes 4 or more, imbricate in the bud. Anthers included in the tube. Ovary 4-or more-celled, with 1 pendulous ovule in each cell ; style with as many linear lobes as cells of

the ovary. Fruit a drupe with a hard several-celled nucleus. Seeds solitary in each cell, oblong cylindrical or curved, funiculus thick closing the orifice of the cell ; testa thin, albumen none or very thin, embryo the shape of the seed, the cotyledons not broader than the superior radicle. Trees or shrubs, often tomentose. Stipules interpetiolar, broad acuminate deciduous. Flowers sessile along the branches of a forked cyme, pedunculate in the axils. Cadamba, *Sonner. Voy.* ii. 228. Matthiola, *Linn. Gen.* 1231. Halesia, *R. Br.* Dicrobotryum, *Willd.* Langieria, *Jacq. St. Amer.* Donkelaaria, *Lemaire.*

1. GUETTARDA SPECIOSA, *Linn.*—A coarse shrub, or small tree, the young branches thick, often flattened, gummy and glabrous or tomentose. Leaves shortly petiolate, broadly obovate-orbicular or ovate, very obtuse, rounded or slightly cordate at the base, 6 to 10 inches long or even more, glabrous above, softly pubescent tomentose or nearly glabrous underneath. Flowers large, in rather dense cymes. Calyx-limb truncate deciduous, 1 to 1½ lines long. Corolla-tube above 1 inch, sometimes 1½ inch long ; lobes 4-9, oblong obtuse not ½ inch long. Ovary-cells 4-9, usually 5 or 6. Drupe nearly globular, attaining 1 inch diameter, chiefly consisting of the very hard woody endocarp, more or less lobed, the interstices filled with a hard fibrous mesocarp, the cells and seeds small and curved. *Wight Ic. t.* 40 ;—*Bot. Reg. t.* 1393.

Ceylon, near Galle and Cultura, called Nil pitcha ; I have never seen it in this presidency in a wild state, but it is frequent in gardens ; it also extends to Australia and the sea coasts from East Africa to the Pacific.

Analysis, Pl. XVII, fig. 2.

1. A flower bud, corol-lobes imbricate.
2. A full flower.
3. Corol removed and opened out.
4. A flower, the corol removed and the calyx opened to show the disk, style and stigma.
5. The sessile anthers, front and back view.
6. Ovary cut vertically, shewing the pendulous ovules.
7. Ovary cut transversely, shewing 5 cells.
8. A fruit.
9. The same cut vertically.
10. A lobe of a corol.
11. Branch of the inflorescence in bud.

TIMONIUS. RUMPH.

Gen. Char. Calyx limb truncate or irregularly toothed, corol-tube cylindrical, lobes 4 or more short thick obtuse with a central rib prominent inside, the margins subimbricate or valvate. Anthers included in the tube. Ovary (normally 5-to 10-celled with several ovules to each cell) divided by spurious dissepiments between the ovules into very numerous 1-ovulate cells, superposed in several irregular rows. Style divided into about 5 to 10 linear lobes. Fruit a drupe, with exceedingly numerous oblongo-linear 1-seeded pyrenes, closely packed and diverging in many rows from the axis. Seeds of *Guettarda.* Trees or shrubs. Stipules membranous, so deciduous as to be rarely seen. Flowers polygamo-diœcious, on axillary peduncles, the females (with small or imperfect stamens) usually solitary, the males (with an abortive ovary) 3 or more together, sessile in the forks or along the branches of pedunculate cymes. *Rumph. Amboin.* iii. 216 *t.* 140. Eupyrena, *Wight. and Arn. Prod.* 422. Pyrostia, *Roxb. Fl. Ind.* i. 388. not *Comm.* Erithalis, *Forst.* not *Linn.* Porocarpus, *Gœrtn. Fr.* ii. 473. Helospora, *Jack.* Polyphragmon, *Desp.* Burneya, *Cham. and Schlecht.* Nelitris, *Gærtn. de Fruct.* i. *p.* 134. *t.* 27. (*exel. syn.*)

1. TIMONIUS JAMBOSELLA, *Gœrtn.*—A very small tree or large shrub polygamo-diœcious, young parts and young leaves strigosely hairy, leaves elliptic lanceolate acuminate entire, 3-7 inches long by 1¼-2½ broad glabrous in age except the costa beneath and the hairy glands in the axils of the primary veins, petioles 6-9 lines long. Stipules hairy on the back ovate acuminate 3-4 lines long. Flowers male on one tree and hermathrodite on another, yellowish white, lobes fleshy subimbricate. *Male* peduncles axillary opposite springing from within the stipules, ½-1½ inches long bifurcate with a flower in the fork, the branchlets few-flowered, flowers subsecund, corol infundibuliform hirsute outside sulcate within. Stamens 4 attached by the middle of the back by a very short filament which does not extend nearly to the base of the lower lobe, style hairy especially towards the apex, stigma minute entire ; *hermathrodite* peduncles axillary 1-flowered 1½ inches long, flowers articulate bibracteolate at the base ; corol-lobes more fleshy than in the male each lobe most prominently 3-sulcate on the inside, filaments much longer than in the male (extending below the lower lobe of the anther), ovary about 12-celled. Style 2-cleft at the apex each arm with 2 entire stigmas. Eupyrena jambosella, *WA. l.c.* Timonius jambosella, *Bedd. Icones. Pl. tab.* cxc.

Ceylon, up to 5000 feet elevation, very common about Badagam near Galle in the south of the island : also in the Peninsula southern districts ?

Analysis, Pl. XVI, fig. 4.

1. A branch of the hermathrodite tree in leaf and flower.
2. Hermathrodite flower, the thick lobes of the corol slightly imbricate.
3. Ovary cut vertically shewing the long cells, style and stigmas, the 4 stigmas or style branches each slightly bifid. (Thwaites described them as trifid, and in dissections that I made in Ceylon for my *Icones* I found them entire. Vide tab. cxc in my *Icones.*)
4. A young fruit.
5. Ovary cut transversely, shewing 13 cells.
6. Young fruit cut vertically.
7. Young fruit cut transversely, 12 cells.

7*a*. The cylindric or slightly curved seed with its thick funicle, which closes the orifice of the cell.

8. A flowering branch of the male tree.

9. A male flower.
10. Corol opened out, the 4 fleshy lobes sulcate within but not quite so prominently as in the hermathrodite.
11. Anthers, front view.
12. Anthers, side view.
13. Calyx and style of the male flower, the style slightly 2-cleft (I found it quite entire in flowers that I dissected.) All from a drawing communicated by Dr. Thwaites.

DICHILANTHE. Thw.

Gen. Char. Flowers aggregated in a globose head. Calyx tube elongato-oblong curved, limb oblique shortly funnel-shaped 5-cleft to the middle, the segments rigid lanceolate acuminate persistent with 5 intermediate scales. Corol funnel shaped sericeous the tube curved, the jaws villous, limb shortly bilabiate, the upper lip 2-the lower 3-toothed, lobes valvate. Stamens 5 inserted into the corol jaws, filaments short. Anthers fixed by the back at the base oblong produced and truncate at the base subacute at the apex, included, disk contracted elevated truncate crenulate hollowed out at the apex. Ovary 2-celled, cells narrow, style stout much exserted, stigma clavate subquadrate 2-lobed, ovules solitary in the cells pendulous from the apex elongato-cylindric, the funicle thickened, fruit thickly coriaceous obovoid gibbous at the back 2-celled crowned by the rigid calyx-limb, seed elongate cylindric narrower than the subglobose funicle, albumen fleshy. Rigid trees, ramuli opposite divaricate terete, the nodes and young parts resinous, leaves opposite petiolate rigidly coriaceous elliptico-lanceolate acuminate, above finely reticulated between the arcuate slender primary veins, beneath obscurely veined, stipules connate into an intrapetiolar short ring, capituli terminal globose in fruit, sessile or shortly pedunculate the peduncle dilated at the apex, flowers sessile small about 6-10 in each head chiefly verticelled round the margins with a few central. *Thw. in Hook. Kew Jour.* viii. 269, *et* 376, *t.* 8-*A* ;—*Benth. and Hook. Gen. Pl.* ii. *p.* 103.

1. Dichilanthe Zeylanica, *Thw.*—A tree 40-50 feet high, leaves 3-7 inches long by $1\frac{1}{2}$-$2\frac{1}{2}$ inches broad, flower heads shortly pedunculate.

Ceylon, in forests between Galle and Ratnapoora at 1000 feet elevation. For Analysis, see Pl. XV, fig. 4, and Manual page cxxiv.

This tree has been described under Caprifoliaceæ at page ccxxiv. of the Manual, but must be excluded from that Order as it belongs to Rubiaceæ.

Tribe VIII, Vanguerieæ.—*Corol lobes valvate, stamens inserted into the corol jaws. Ovary 2-many celled, ovules solitary anatropal fixed above the middle of the cells pendulous, raphe dorsal, micropyle superior, drupe with 1-many pyrenes or a 1-many-celled putamen. Seed various, albumen copious, cotyledons generally compressed broad, radicle superior. Trees or shrubs, inflorescence axillary.*

PLECTRONIA. Linn.

Gen. Char. Calyx-tube short obconical turbinate or hemispherical, limb very short cupular or annular truncate or 4-5-toothed, generally deciduous. Corol-tube short or cylindrical often furnished with a ring of hairs within, lobes 4-5 valvate in the bud reflexed in age. Stamens as many as the corol lobes exserted or rarely included, filaments none or short, anthers fixed by the back at the base, disk annular tumid or depressed, ovary 2-celled with 1 ovule in each cell laterally attached near or at the top. Style much exserted and flexuose or included. Stigma thick ovoid or mitre-shaped entire or 2-lobed, drupe didymous or globose and compressed with 2 or rarely 3 one-seeded pyrenes, or by abortion with only 1 pyrene, pyrenes crustaceous or bony. Seed large pendulous oblong, testa membranaceous, albumen fleshy, embryo elongate terete, cotyledons short, radicle superior. Trees or shrubs unarmed or spinose, stipules interpetiolar pointed with a broad base, flowers in axillary cymes or clusters. *Linn. Mant.* 6. Canthium, *Lam. Dict.* i. 602. Psydrax, *Gærtn. Fruct.* i. 125. *t.* 26. Dondisia, *DC. Prod.* iv. 469. Mitrastigma, *Harv. in Lond. Journ.* i. 20. Psilostoma, *Klotzsch.* Phallaria, *Schum. et Thonn.*

1. Plectronia didyma, *Gærtn.*—For description, &c. see Plate ccxxi (under the name Canthium.)

Plectronia montana, *Thw,* is, I believe, only a variety of this species.

2. Plectronia parviflora, *Roxb.*—A scraggy thorny shrub, trunk scarcely any, branches numerous spreading, thorns simple opposite above the axils spreading cross armed very strong and sharp, sometimes 3-fold leaves on the young shoots opposite on the older branches fascicled, short petioled reflexed ovate entire smooth variable in size, racemes short axillary few-flowered, flowers tetramerous yellowish, calycine teeth small ovate acute or oblong and somewhat foliaceous, corol-tube glabrous short downy in the mouth. Style a little longer than the corol-tube, stigma somewhat globose often more or less bifid or marked with a longitudinal furrow, drupe obcordate compressed furrowed on each side, as large as a cherry, crowned with the remains of the calyx, fleshy yellowish smooth 2-celled, pyrenes oblong. Canthium parviflorum, *Roxb. Fl. Ind. ed. Wall, vol.* ii. *p.* 170.

A very common bush, much used as a hedge plant, called Balsu in Teligoo ; the wood is very hard and in use for turnery purposes ; the leaves are eaten in curries.

3. Plectronia Rheedii, *DC.*—A shrub armed with supra-axillary thorns, branches hirsute, leaves oval to ovate or lanceolate acuminate very shortly petioled, shining above furnished with hairs in the axils of the veins beneath, flowers 5-merous axillary few shortly pedicelled fascicled or in very short racemes, calycine teeth minute, corol acuminated in the bud tube shortly campanulate, lobes acuminate, stigma mitriform, drupe obovate emarginate. Canthium Rheedii, *DC. Prod.* iv. 474.

A most variable species. Common in moist forests on the western side of the Presidency and in Ceylon ; the leaves are generally quite rounded or cordate at the base, about 2 inches long and $1\frac{1}{4}$ broad ; one variety from the Wynaad has the leaves 5 inches long and $2\frac{1}{2}$ broad, another variety from 5000 feet on the Travancore hills has linear lanceolate leaves 10-15 lines long by 3-6 lines broad ; it has glabrous stems, rather stout slightly recurved thorns 2 lines in length and very minute flowers ; this I have named var. *c.*

linearis, but it is probably a distinct species. Dr. Thwaites' var. δ. is also perhaps a distinct species, the thorns are very slender quite straight and about 5 lines long, the stems hairy, the leaves very small and generally quite ovate and the flowers very large.

4. Plectronia Leschenaultii, *DC.*—A shrub, glabrous, old branches armed with short supra-axillary thorns, young shoots long slender often unarmed, petioles shortish twisted, leaves opposite or 3-4-verticellate oblong much acuminate acute at the base, cymes axillary short peduncled 3-5 flowered, flowers pentamerous, corol acuminate in the bud, tube campanulate with a ring of reflexed hairs inside, lobes linear lanceolate acuminate reflexed, anthers exserted at length reflexed, style thickened about the middle and hairy downwards, stigma mitriform bifid to about the middle, drupe obcordate. Dondisia Leschenaultii, *DC. Prod.* iv. 469. Canthium Leschenaultii, *WA. Prod.* 426.

A common shrub in our western jungles.

5. Plectronia Neilgherrensis, *Wight.*—A small tree unarmed, branchlets obtusely 4-sided glabrous, leaves short petioled ovate bluntly acuminate membranaceous, 4-5 inches long by about half as broad, glabrous or sub-glabrous above slightly hairy beneath, peduncles axillary about as long as the petioles bearing a small umbel of several flowers furnished with subulate bracts, flowers 5-merous small white, very hairy in the throat, calyx limb truncate 5-toothed. Stamens short nestling in the hairs, ovary 2 celled, stigma capitate, drupe glabrous obovate succulent compressed cream-colored. Canthium Neilgherrense, *Wight Icones tab.* 1064.

Common on the Nilgiris about Sisparah 5000-6000 feet elevation, and on the Travancore hills (Aghasteer) at about 5000 feet.

Analysis.

For Analysis of the fruit, seed and embryo, see Plate ccxxi, fig. A.

6. Plectronia macrocarpa, *Thw.*—Shrubby subscandent thorns axillary very stout recurved, branches terete rufo-pilose when young glabrous in age, leaves ovate acuminate, 1½-3 inches long by ¾-1½ broad densely rufo-pilose beneath particularly on the prominent veins, sparingly pilose above, petioles 2-3 lines long pilose, cymes pilose solitary in the axils, the peduncles 6-8 lines long, flowers numerous on the dichotomous branchlets with a single one in the fork, brownish-white rounded at the apex in the bud, 5-merous; calyx minutely toothed, corol about 3 lines long contracted above the tube when in bud, the lobes lanceolate a little hairy on the outside at length reflexed and a little longer than the tube, tube pilose within. Stamens exserted, style hairy much exserted, stigma thick ovoid entire sulcated, drupe roundish rather compressed emarginate 1 inch long, seeds tuberculate. Canthium macrocarpum, *Thw. En. Pl. Zey. p.* 152 ;—*Bedd. Icones Pl. tab.* ccxxxviii.

Ceylon, Hantani, at 3000 feet elevation.

7. Plectronia campanulata, *Thw.*—Shrubby subscandent thorny, branchlets terete pilose, leaves glabrous rounded ovate or lanceolate obtusely acuminate apiculate 5-14 lines long by 3-8 lines broad, petioles 1-1½ lines long, fascicles 1-4 flowered axillary, the pedicels glabrous slender 3-4 lines long, flowers 5-merous, calyx glabrous minutely toothed, corol campanulate acute in the bud constricted at the middle, the lobes and tube each about 2 lines long the latter pilose at the base, anthers a little exserted, style conical, stigma obconical truncate at both ends undivided, drupe the size of a pea obcordate compressed, seed tuberculate. Canthium campanulatum, *Thw. En. Pl. Zey. p.* 153.

Ceylon, Deltotte, in the central provinces, at an elevation of 3000 feet.

8. Plectronia Travancorica, *Bedd.*—A middling sized tree unarmed, branches terete glabrous. Stipules with a long subulate point (5 lines long) from a broad base, leaves ovate with a bluntish acumination glabrous membranaceous, about 2 inches long by 1 inch broad, much paler beneath, petioles 6-8 lines long, cymes glabrous slender many-flowered axillary or from tubercles at the axils solitary or several together shorter than the leaves, pedicels elongate and slender, flowers 4-merous very small rounded in the bud campanulate, calycine teeth subulate persistent the tube and lobes of the corol each 1-1½ lines long, tube with a ring of hairs in its jaws, lobes ovate scarcely acute, stamens exserted, style much exserted glabrous, stigma globose sulcate, fruit not seen. *Bedd. Icones Pl. tab.* ccxxxix.

I have only met with this tree on the Travancore and Tinnevelly ghats.

Tribe IX, Ixoreæ.—*Corol lobes contorted. Stamens inserted in the jaws or mouth of the corol, ovary 2-(rarely 3-4-) celled, ovules solitary in the cells anatropal or amphitropal, fixed at the middle or above the middle very rarely at the base of the cell, fruit baccate or coriaceous 2-4-celled or with 2-4 pyrenes pyrenes coriaceous, or rarely only 1-celled, seed flat on the inner face or concave, albumen horny, embryo curved small or middle sized, cotyledons flat broad, radicle terete inferior. Trees or shrubs, stipules entire.*

IXORA. Linn.

Gen. Char. Calyx-tube ovoid, limb short 4-rarely-5-toothed persistent, lobes short or subelongate, corol hypocrateriform, tube slender cylindrical naked or hairy in the jaws, the lobes 4 (rarely 5) shorter than the tube spreading, contorted in the bud. Stamens 4 (rarely 5), filaments short or none, anthers fixed by the back linear or oblong, generally acuminate, erect, exserted or semi-exserted, disk fleshy tumid, ovary 2-celled, style filiform with 2 short exserted patent or recurved arms which are rarely connate, ovules solitary in the cells, peltately attached to the middle of the partitions, amphitropal, micropyle inferior, berry fusiform coriaceous or fleshy with 2 pyrenes, which are chartaceous with the inner face concave or sometimes flat and the back convex. Seed in shape like the pyrene, umbilicus ventral, testa membranaceous, albumen cartilaginous, embryo dorsal incurved, cotyledons foliaceous, radicle terete inferior. Shrubs or trees, leaves opposite or rarely verticelled in threes, stipules interpetiolar acuminate from a broad base persistent or deciduous, flowers in terminal dense or large corymbs or panicles, or rarely in axillary or lateral cymes white rose or scarlet. Siderodendron, *Schreb. Gen.* 71. Sideroxyloides, *Jacq. Stirp. Am.* 19. *t.* 175. *f.* 9.

1. Ixora parviflora, *Vahl.*—For description, &c. see Pl. ccxxii.

2. Ixora barbata, *Roxb.*—A small tree glabrous, leaves oblong suddenly and obtusely pointed glabrous and shining, the primary veins very prominent, 6-9 inches long by 3½-4 broad, corymbs terminal longer than the leaves the peduncle furnished below the middle with a large pair of nearly orbicular cordate pointed or emarginate floral leaves or bracts, 1½-2 inches each way, the true bracts at the base of the branchlets of the corymbs linear small, flowers very numerous, rose colored, calyx-segments subfoliaceous, corol-tube long and slender, berry red smooth size of a pea. *Roxb. Fl. Ind. ed. Wall.* i. *p.* 394 ;— *Wight Icones tab.* 185.

A very common tree in the mountain forests on the west side of the presidency up to 4500 feet elevation.

3. Ixora calycina, *Thw.*—A small tree, glabrous, leaves ovate or lanceolate acuminate, rounded cordate or acute at the base, 1½-4 inches long by ½-2 inches broad, the primary veins sub-horizontal, petioles 1-2 lines long, corymbs terminal trichotomous, pedicels short crowded, bracteoles long linear, calyx-segments entire lanceolate acute 3-5 times longer than the ovary, corol white with a tint of red, the lobes oblongo-rotundate acute, anthers with short filaments, berry ovoid or spherical crowned with the calyx. *Thw. En. Pl. Zey. p.* 155 ;—*Bedd. Icones Pl. tab.* xcvii.

Ceylon, central provinces, up to 7000 feet elevation.

4. Ixora jucunda, *Thw.*—A small tree 10-20 feet high, leaves glabrous lanceolate or ovato-lanceolate acuminate, 4-8 inches long by 1-4 inches broad, petioles 2-5 lines long, corymbs reddish terminal pilose many-flowered trichotomous at the base primary divisions elongate, bracteoles small acute, calyx-segments truncated shorter than the ovary, corol white tinted with red, lobes about 2 lines long oblong rather acute, tube from 2-3 lines in length in one variety to 7-14 lines long in another, berry subspherical blackish red. *Thw. En. Pl. Zey. p.* 155 ;—*Bedd. Icones Pl. Ind. tab.* xcvii.

Ceylon, up to 4000 feet elevation.

5. Ixora polyantha, *Wight.*—A large shrub, glabrous except the inflorescence, leaves elliptic oblong obtuse or bluntly acuminate, 8-16 inches long by 4-7 inches broad, corymbs densely hairy terminal contracted many-flowered, flowers 4-merous, calyx-tube densely hairy, the lobes ovate lanceolate acuminate and glabrous as are the scariose bracts, corol glabrous, tube long slender, the lobes obtuse reflexed. *Wight Icones tab.* 1066.

Very common in South Canara and Malabar ; a very beautiful shrub that ought to be introduced into our gardens.

6. Ixora coccinea, *L.*—A very beautiful shrub with scarlet flowers so common in our gardens, is abundant in the jungles of our western coast in the vicinity of the sea. 7. Ixora acuminata, *Roxb.* ; *Wight Icones tab.* 706, 8. Ixora nigricans, *Br.* ; *Wight. Icones tab.* 318, and 9. Ixora lanceolata, *Coleb.* ; *Wight. Icones tab.* 827, are small shrubs found in our western mountain jungles.

PAVETTA. L.

Gen. Char. The same as that of Ixora, except that the style is generally longer and more slender, with the stigma fusiform or clavate and undivided or 2-toothed, the stipules are often connate in a loose sheath and the placentas more tumid ; the 2 genera have lately been joined by some botanists, but Bentham and Hooker keep them distinct in their new Gen. Pl. Crinita, *Houtt.* Baconia, *DC.* Verulamia, *DC.*

1. Pavetta Indica, *Linn.*—A small tree or good sized shrub, leaves oval oblong acuminated short petioled glabrous on both sides or somewhat puberulous beneath shining above, 4-6 inches long by 2-2½ broad, stipules broad, upper ones often connate at the base, corymbs compound their primary branches opposite the peduncles and pedicels smooth terete, flowers white fragrant generally 4-merous rarely 5-merous, in bud gradually thicker upwards, calyx-segments minute obtuse, corol lobes oval obtuse 2-3 times shorter than the tube, style twice as long as the corol glabrous, stigma clavate hispid, berry globular size of a pea. *Linn. Sp. p.* 160. Ixora Pavetta, *Roxb. Fl. Ind. ed. Wall.* i. *p.* 395.

Common throughout India and Ceylon, and also in the Archipelago and in Queensland.

2. Pavetta tomentosa, *Roxb.*—A small tree or large shrub, leaves oblong to ovate pointed ventricose downy on both sides, 4-8 inches long by 3-5 inches broad, corymbs dense, the whole inflorescence and calyxes tomentose or hoary pubescent, flowers numerous white fragrant, calyx-limb small with minute teeth, corol fruit seeds as in Pavetta Indica. *Roxb. Fl. Ind. ed. Wall.* i. 396. Pavetta Brunonis, *Wall.* ;—*Wight's Icones tab.* 1065. P. Rothiana, *DC. Prod.* iv. 491. P. hispidula, *WA. Prod.* 431.

Not uncommon throughout the presidency, Ceylon and North Australia ; the Ceylon plant has long narrow calyx-segments, and as far as my specimens go it appears to have smaller and narrower leaves, so that it may prove a distinct species ; but the calycine segments are also subject to variation in the next species.

3. Pavetta breviflora, *DC.*—A large shrub, leaves oval acute at the base acuminated short petioled submembranaceous furnished with numerous dark glands glabrous turning black in drying, corymbs short dense many flowered glabrous, calyx-segments minute glabrous or rather enlarged and ciliate, corol tube about 3 lines long scarcely longer than the lobes, style not much exserted. *DC. Prod.* iv. 491 ;—*Wight's Icones tab.* 1035.

Common in woods on the higher ranges of the Nilgiris.

4. Pavetta involucrata, *Thw.*—A large shrub 10-12 feet high turning black in drying, leaves glabrous shining above obovate or obovato-lanceolate shortly acuminate, the base narrowed rounded or acute, 2½-5 inches long by 1-2 inches broad, petioles 36 lines long, flowers glomerate in solitary axillary pedunculate heads furnished with an involucre, the peduncle about 1 inch long, the involucre leafy, the scales membranaceous pilose on the inside ; calyx-segments linear pilose within about as long as the tube, corol white the lobes acute nearly as long as the tube, style twice as long as the corol slightly pilose at the apex, stigma minutely 2-toothed, berry spherical as large as a pea black. *Thw. En. Pl. Zey. p.* 156 ;—*Bedd. Icones tab.* c.

Ceylon, central provinces, at 5000-7000 feet elevation.

Analysis, Pl. XXIX., fig. 6.

1. Portion of a branch shewing stipules.
2. A flower, the contorted corol-lobes just opening.
2*a*. A full flower, anthers exserted.
3. Corol cut open to shew the insertion of the stamens, jaws hairy.
4. Anthers, front and back view.
5. Calyx, ovary, style and stigma, the latter slightly 2-toothed.
6. The 2-celled ovary cut vertically, ovules solitary attached to the centre of the axis.
7. A bunch of fruit or berries.

5. PAVETTA SIPHONANTHA, *Dalz.*—Is a very beautiful small shrub common in the Wynaad, Coorg, Canara, &c., its very large flowers make it a most desirable plant for cultivation. From this 6. PAVETTA ANGUSTIFOLIA, *Thw.*, figured in Plate xcix of my *Icones*, does not differ in any way except in its much narrower and smaller leaves, and it must, I think, be only considered a variety. I have the same or a very similar form (differing only in the leaves being of a much paler color and the flowers a little smaller) from the Coorg and Tinnevelly mountains ; I have 2 other shrubs so closely allied to Dalzell's Siphonanthus, that I hardly like to consider them as distinct species : the first of these has the young stems pilose or almost scabrous, the leaves pilose beneath, pentamerous flowers, and the style included ! and glabrous ; this I have collected on the northern and western slopes of the Nilgiris (Ouchterlony Valley and Sispara ghat) and on the Peria peak in Wynaad. (7. PAVETTA NILAGIRICA, *Bedd. in distr.*) the 2nd is glabrous throughout, the flowers pentamerous fewer and rather larger but with a shorter thicker tube than in typical siphonanthus, the style stout hairy in its lower half, not much exserted (corol tube 1 inch, style $1\frac{3}{4}$ inch long) ; this I have only found on the South Canara ghats. (8. PAVETTA CANARICA, *Bedd. in distr.*)

Coffea alpestries, Wight, and Coffea grumelioides, Wight. (Wight's Icones plates 1040 *and* 1041*) two shrubs common on the Nilgiris should, from their general habit and terminal inflorescence, rather find a place in this genus than in Coffea ; if referred to Coffea on account of the short corol-tube and short style, Pavetta breviflora would also have to be removed to that genus ; Pavetta however is described as rarely having axillary inflorescence, and if this is the case, the difference between the* 2 *genera is obscure and confined to the seed and its testa. I have not seen the ripe fruit of these* 2 *shrubs, so cannot say whether the seeds have the longitudinal furrow on their inner face and the intruding testa.*

COFFEA. LINN.

Gen. Char. Calyx-tube short subcylindrical oblong or turbinate, limb persistent short truncate, toothed or lobulate, often glandulose within or the teeth glandulose, corol hypocrateriform or infundibuliform, the tube short or elongate, the jaws glabrous or villous, the lobes 4-5 oblong spreading, contorted in the bud. Stamens 4-5 inserted into the jaws of the corol, filaments short or none, anthers fixed by the back near the base, linear obtuse or acute included or exserted, often in age recurved or twisted, disk tumid, ovary 2-celled, style filiform or thick glabrous, the branches 2 linear or subulate, ovules solitary in the cells subpeltately affixed to the middle (rarely higher) of the partition, berry globose or oblong dry or fleshy with 2 pyrenes, pyrenes coriaceous or chartaceous convex on the back, the inner face flat with a longitudinal furrow, seed of the same shape, umbilicus ventral, testa membranaceous intruding into the furrow of the putamen, albumen horny, embryo dorsal curved, cotyledons foliaceous cordate, radicle elongate terete inferior. Shrubs, generally glabrous, leaves opposite or rarely verticelled in threes membranaceous or subcoriaceous sessile or petioled, stipules broad acuminate persistent, flowers glomerate in the axils of the leaves sessile or shortly pedicellate white often fragrant, pedicels bracteolate. *Linn. Gen. n.* 230.

1. COFFEA ARABICA, *L.*—A large shrub or small tree. Stipules on both sides solitary entire, leaves oblong-ovate acuminate glabrous, peduncles axillary short aggregated, calyx-limb not increasing after flowering, corol 5-cleft glabrous in the throat, anthers linear entirely exserted, style exserted. Stigma bipartite with the lobes linear, berry ovate. *DC. Prod.* iv. 499.

Introduced from Arabia, and now very common in a cultivated state on the west side of the Presidency, and run wild in some of our forests.

Analysis, Pl. XVII., fig. 1.

1. Portion of a branch in leaf and flower.
2. Axillary fascicle of flowers, corol-lobes contorted.
3. A full flower.
4. Corol removed and opened out, shewing the stamens.
5. Anthers, front and back view.
6. A flower, the corol removed shewing the style and stigma.
7. Ovary cut vertically, shewing the solitary ovules attached to the centre of the axis.
8. Ovary cut transversely, 2 cells.
9. Ripe fruit.
10. The fruit opened lengthways, shewing 2 seeds.
11. A ripe seed.
12. The same, side view.
13. Seed cut vertically.
14. Seed cut transversely.

2. COFFEA BENGHALENSIS, *Roxb.*, (C. Wightiana, *Wall.* ; C. Travancorensis, *WA.*) *Wight Icones tab.* 1598.—Is a very small shrub found (though not common) throughout the Presidency and in Ceylon.

Tribe X, MORINDEÆ.—*Corol-lobes valvate. Stamens inserted into the mouth or jaws of the corol, ovary* 2*-or imperfectly (rarely derfectly)* 4*-celled, ovules solitary in the cells, or in the imperfectly* 4*-celled ovaries (Morinda) twin, anatropal or amphitropal fixed at the*

middle or below the middle of the cell, raphe dorsal, micropyle inferior, fruit baccate or drupaceous 2-4 celled or with 2-4 pyrenes, seed various, umbilicus ventral or subbasal, albumen horny, embryo straight or curved, cotyledons linear or plane, radicle terete inferior or excursive. Trees or shrubs, erect or scandent, stipules solitary on each side entire or rarely divided.

MORINDA. Linn.

Gen. Char. Flowers hermathrodite, rarely by abortion unisexual, confluent into a small head. Calyx-tube urceolate or hemispherical, the limb short truncate or obscurely toothed persistent, corol infundibuliform or hypocrateriform, the tube short glabrous or pilose in the jaws, the lobes 5 rarely 4, 6, 7-coriaceous valvate. Stamens as many as the corol lobes inserted into the jaws, filaments short, anthers fixed by the middle of the back linear or oblong obtuse at both ends, included or exserted ; disk tumid or annular. Ovary 2-or imperfectly 4-celled (rarely completely 4-celled.) Style included or exserted glabrous or pilose, with 2 short or elongate linear branches. Ovules twin when the cells are only 2 or imperfectly divided into 4, (solitary in the completely 4-celled ovaries) inserted near the base (or below the middle) of the cell, ascending anatropal or amphitropal, fruits of each flower-head united into a compound succulent berry (syncarpium), containing many hard 1-seeded pyrenes which are sometimes concrete into a 2-4 celled putamen. Seed ovoid or reniform, testa membranaceous, albumen fleshy, embryo terete, radicle inferior. Trees or shrubs, sometimes scandent glabrous or pubescent, leaves opposite or verticelled in threes. Stipules connate within the petioles in a short sheath, flower-heads on axillary or terminal solitary or clustered peduncles, flowers white. *Linn. Gen. n.* 235. Sphærophora, *Blume. Mus. Bot.* i. 179. *f.* 36.

1. Morinda citrifolia, *L.*—For description, &c., see Pl. ccxx.

The analysis which was drawn from living flowers, gives both 5-merous and 6-merous flowers, and shows the imperfectly 4-celled ovary. (I have never detected completely 4-celled ovaries.)

2. Morinda bracteata, *Roxb.*—A small tree, glabrous, leaves opposite to each other or to a peduncle oblong or oval-oblong, acute smooth polished deep green on both sides, 6-12 inches long by 3-4½ inches broad, petioles 6-7 lines long ; stipules broader than long rounded, peduncles solitary and always leaf-opposed round smooth 1-2 inches long supporting a single head of pure white flowers. Calyx a tumid ring, a small portion of the margin of which grows out into a long linear prominent leaflet, corol long funnel-shaped woolly in the mouth, filaments short, anthers linear included or exserted. Stigma 2-cleft exserted. Syncarpium size of a crab-apple. *Roxb. Fl. Ind.* i. *p.* 544 ;—*Wight Icones tab.* 126.

This species is very frequent about native gardens, temples, &c., in India and Ceylon, and it is wild in the north-east part of this Presidency, the root yields a dye.

3. Morinda exserta, *Roxb.*—A small tree, young shoots glabrous or villous, leaves opposite to each other or to a peduncle oval or oblong to ovate or lanceolate waved at the margins glabrous or downy, 4-5 inches long by 3-4 inches broad, petioles short, stipules broadly-oval obtuse entire emarginate or bifid, peduncles usually solitary sometimes 2 together leaf-opposed or in the axil of a small leaf, round smooth about 1 inch long each supporting a round head of many pure white flowers without floral leaves or bracteas, calyx annular, corol long infundibuliform, the limb 5-cleft, anthers much exserted, style the length of the tube. Syncarpium oval or roundish. *Roxb. Fl. Ind.* i. 545.

This tree is common in the Godavery forests, and the Circars, it is called in Teligu Togara mogali and Mogali, and 'Al in Hindustani ; the root yields a red dye ; the wood is hard and yellow and does not warp.

4. Morinda umbellata, *Linn.*—A large climbing shrub, glabrous or pubescent, leaves oblong-lanceolate to cuneate-oblong or obovate pointed glabrous or pubescent, usually with a small hairy gland in the axils of the veins on the under side, 1½-3 inches long, petioles about 3 lines long. Stipules membranaceous united into a truncated sheath, peduncles 3-8 together at the ends of the branches, about ½ as long as the leaves each with a small head of 6-12 flowers, the calyx tubes connate or immersed in the receptacle the margin entire, corol with a short straight tube scarcely as long as the 4-5-cleft limb, filaments short included inserted into the bottom of the dilated part of the tube amongst much hair, anthers exserted. Syncarpium 4-6 lines in diameter. *Linn. Sp. p.* 250. M. scandens, *Roxb. Fl. Ind.* i. 548.

Common in our western forests up to about 4000 feet elevation ; the tough stems are used as ropes in Ceylon. A species from the Nilgiris (Sispara ghat) 5000 feet elevation, appears to differ in having sessile or subsessile peduncles but my specimens are not perfect enough for description.

I have a very distinct species from South Tinnevelly, but only in very young bud ; the leaves and stems are covered with a very soft ash colored tomentum, the former are narrow linear lanceolate about 6 inches long by 1 broad and much scolloped in their lower half, inflorescence axillary, stipules much shorter than broad ; it is a small tree and I found it on low hills between Singamputty and Seerumuthu ayen koil : it may be M. stenophylla, Spr.

PRISMATOMERIS. Thw.

Gen. Char. Flowers unisexual, calyx-tube in the male flower small turbinate, in the fertile obovoid, limb cupular truncate or 5-(in the fertile flower minutely 4-) toothed persistent, corol hypocrateriform, tube cylindric, jaws glabrous, limb with 4-5 lobes spreading triangular subimbricate (or valvate ?), staméns as many as the lobes inserted on the corol-tube, filaments short, anthers fixed by the back near the base, linear included, disk cushion-like, ovary 2-celled, style filiform, stigma fusiform 2-fid or the style branches 2 linear or lanceolate, ovules solitary in the cells fixed above the middle of the partition, berry globose or pea-shaped ovoid fleshy 1-2 celled, 1-rarely 2-seeded, seed subglobose deeply excavated, umbilicus ventral, testa membranaceous, albumen fleshy or horny, embryo small axile, cotyledons reniform, radicle long obtuse inferior. Shrubs, branchlets compressed 4-angled, leaves subcoriaceous opposite

penniveined, stipules intrapetiolar broad 1-2-cuspidate, flowers white on slender pedicels axillary and sub-umbellately fascicled at the apices of the branches. *Thw. in Hook. Kew Journ.* viii. 268, *t.* vii-*A*.

1. Prismatomeris albidiflora, *Thw.*—A shrub, leaves elliptic with a short blunt acumination, 3-4 inches long by 1-1¼ broad, pedicels 1½ inches long solitary or twin in the axils or 3-4 subumbellately fascicled at the apices of the branches, corol very fleshy. *Thw. l. c.*;—*Bedd. Icones. Pl. Ind. Plate* xciii.

Ceylon, up to 4000 feet elevation.

Analysis, Pl. XXIX, fig. 4.

1, 2. Male flower buds, calyx slightly 5-toothed, corol-lobes fleshy subtriangular somewhat imbricate.
3. Corol opened out, stamens included, filaments quite adnate with the tube except at their apices but continued down to nearly its base though requiring to be peeled off to separate them from the tube.
4, 5. Anthers, front and black view.
6. Ovary, style and stigma from a fertile flower.
7. Ovary cut vertically, ovules solitary pendulous.
8. Ovary cut transversely, 2 cells.
9. A fruit. (All drawn from dried specimens.)
10, 11, 12. Views of the seed; from a drawing by Dr. Thwaites.

2. Prismatomeris Fergusonii, *Thw. MS.*—A shrub very similar to the preceding but with the leaves rather larger, the pedicels shorter, all terminal and more numerous, and the corol much less fleshy.

Ceylon, near Columbo (the imbrication of the corol-lobes is easily seen in this species.)

Tribe XI, Psychotrieæ.—*Corol lobes valvate. Stamens inserted into the jaws of the corol, ovary* 2-(*rarely* 4-8-) *celled, ovules solitary in the cells, basal, anatropal, often cuneate compressed, fruit with* 2 *pyrenes, which are convex on the back and flat sulcate or concave on the inner face, albumen generally horny, embryo often curved, cotyledons flat or semiterete, radicle straight or curved inferior. Trees or shrubs, rarely herbs.*

PSYCHOTRIA. Linn.

Gen. Char. Flowers hermathrodite rarely polygamo-diœcious, calyx-tube short, limb truncate toothed or lobed rarely persistent, corol funnel-shaped tubular or subcampanulate, the tube short or elongate straight, the jaws naked pilose or villous, the lobes 5 or rarely 4-6 valvate, stamens as many as the corol lobes inserted into the mouth or jaws of the corol, filaments short or subelongate, anthers fixed by the back near the base linear or oblong obtuse included or exserted; disk various, ovary 2-celled, style short or elongate glabrous or pilose with 2 short subulate linear or rarely spathulate branches. Ovules solitary in the cells erect from the base anatropal generally cuneate, berry or drupe small ovoid globose or pear-shaped sometimes didymous smooth or costate with 2 pyrenes or dividing into 2 cocci with a coriaceous endocarp. Seed hemispherical resembling the pyrene or endocarp in shape convex, on the back smooth costate or sulcate, the inner face flat or rarely concave often furrowed longitudinally, testa thin sometimes intruding within the furrow of the albumen, albumen fleshy or bony sometimes ruminate, embryo small, cotyledons flat ovate orbicular or lanceolate, radicle terete inferior. Shrubs or small trees, or climbing plants. *Linn. Gen. n.* 229. Grumilea, *Gœrtn.* Mapouria, *Benth. in Oerst. Cent. Am. Rub.* 10. Simira, *Aubl. Pl. Gui.* Mapouriopsis, *Griseb. Fl. Brit. W. Ind.* Patabea, *Aubl. l. c.* Ronabœa, *Aubl. l. c.* Strempelia, *A. Rich. in Mem. Soc. His. Nat.* Polyozus, *Bl. Bijdr.* Streblosa, *Korth. in. Ned. Kruidk. Arch.* Myrstiphyllum, *P. Br. Hist. Jam.* Psychotrophyum, *P. Br. l.c.*

This genus is abundantly represented by small shrubs in our moist western forests up to the highest elevations; there are some 8 or 10 species in this Presidency, and some 8 or 9 distinct ones in Ceylon: the species are difficult to distinguish, and have not as yet been thoroughly worked out; I have given Analysis from P. elongata, one of our commonest species.

Analysis, Pl. XVII, fig. 6.

Psychotria elongata.

1. Portion of the inflorescence.
2. A flower bud, corol-lobes valvate.
3. A 5-merous flower.
4. A 4-merous flower.
5. A 5-merous flower opened.
6. A tube of the corol.
7. Anthers, front and back view.
8. A flower, corol removed and calyx opened to shew disk, style and the 2-lobed stigma.
9. Ovary cut vertically to shew the erect ovules.
10. Ovary cut transversely.
11. Portion of a fruit branch.
12. A fruit.
13. The same cut vertically, seeds with ruminated albumen.
14. The same cut transversely.
15. The embryo. (All drawn from living specimens.)

LASIANTHUS. Jack.

Gen. Char. Calyx-tube subglobose ovoid or oblong, limb short or elongate 3-6-toothed or lobate persistent. Corol infundibuliform or hypocrateriform, the tube short or subelongate, the jaws villous, the lobes 4-6 spreading, valvate in the bud, stamens 4-6 inserted into the jaws of the corol, filaments short, anthers fixed by the back near the base included or shortly exserted linear or ovato-

oblong, connective often apiculate, disk tumid, ovary 4-9-celled, style short or subelongate glabrous or pilose, the stigmas equalling the number of ovary cells short obtuse, ovules solitary in the cells linear erect from the base anatropal, drupe with 4-9 pyrenes, pyrenes cartilaginous or crustaceous 1-seeded. Seed linear-oblong slightly curved, testa membranaceous, albumen fleshy, embryo terete elongate, cotyledons short obtuse, radicle elongate inferior. Shrubs, often fetid, glabrous tomentose or strigose, branchlets terete, compressed at the ends, leaves distichous opposite shortly petiolate generally caudato-acuminate, the transverse venules prominent. Stipules inter-petiolar broad persistent or deciduous, flowers white small capitate or fascicled or rarely at the apex of a peduncle in the axils of the leaves, fruit small. *Jack. in Trans. Linn. Soc. XIV.* Mephitidea, *Reinw. et Bl. Bijdr.* Santia, *WA. Prod.* 422.

This genus is most abundantly represented by small shrubs in all our moist western forests up to the highest elevations; about 20 species are described from this Presidency and Ceylon, several of which I have figured in my *Icones*; there is a close resemblance between them all, the genus is readily known by its numerous stigmas.

I have given analysis from one of the commonest species (L. venulosus, abundant in woods about Ootacamund.)

Analysis, Pl. XVII, fig. 5.

LASIANTHUS VENULOSUS.

1. A flower bud.
2. A full flower.
3. A 5-merous corol removed and opened.
4. A 4-merous corol.
5. Anthers, front and back view.
6. Calyx, style and 4-lobed stigma.
7. Ovary cut vertically, shewing the erect ovules.
8. Ovary cut transversely, shewing its 4 cells.

SAPROSMA. BLUME.

Gen. Char. Calyx-tube obconical, limb dilated or subcampanulate 4-lobed or unequally 4-6 toothed or lobate persistent; corol campanulate or infundibuliform villous in the jaws, the lobes 4 short obtuse induplicate-valvate, the margins flat or crispate. Stamens 4 inserted into the corol jaws, filaments short or none, anthers fixed at the back near the base linear half exserted, disk hemispherical. Ovary 2-celled, style filiform the branches or stigmas 2 included, ovules solitary in the cells erect from the base anatropal, fruit obovoid oblong ellipsoid or globose, with 2 pyrenes, pyrenes crustaceous, endocarp cartilaginous or crustaceous, seed erect plano-convex, the ventral face not furrowed subovoid, testa membranaceous, albumen fleshy, embryo axile equalling half the seed, cotyledons broad ovate or cordate foliaceous, radicle elongate terete inferior. Shrubs or small trees, generally glabrous very fetid when crushed, leaves opposite or ternately verticelled, flowers white small sessile and congested or on axillary or terminal peduncles, drupe small purple. *Blume Bijdr.* 956. Dysosmia, *Miq. Fl. Ind. Bat.* ii. 325. Dysodidendron, *Gard. in Calc. Journ. Nat. Hist. VII.* 56. Serissa, *Thw.* not *Commers.*

1. SAPROSMA WIGHTII, *Gardn.*—A shrub or small tree 8-12 feet or more, branches terete dichotomous, leaves glabrous penni-veined lanceolate acuminate attenuated at the base, 3-3½ inches long 10-15 lines broad, petioles ½ an inch, stipules connate toothed, peduncles 1 flowered, axillary or terminal 4 lines long bi-bracteolate a little above the base and at the apex, calyx tube obovate adherent glabrous ebracteolate at the base, limb 4-toothed, teeth broad acute, corol purplish infundibuliform very minutely papillose on the out-side, about 6 lines long deeply 4 cleft, stamens included or very slightly exserted, fruit obovate to oblong deep blue very fetid. Lasian-thus ? fœtens, *Wight.* Dysodidendron Wightii, *Gardn.* Serissa Wightii, *Bedd. Icones. Pl. Ind. Or. tab.* xv.

In moist woods on the Nilgiris 6000 feet, Anamallays, Coimbatore hills, Tinnevelly ghats 3000-4000 feet.

Analysis, Pl. XVII, fig. 4.

(Under the name of Serissa, which should be altered to Saprosma.)

1. A bud, corol lobes induplicato-valvate.
2. A full flower, showing the margins of the lobes of the corol folded over.
3. Corol removed and opened to show the stamens.
4. Anthers, front and back view.
5. Ovary cut vertically, shewing the erect ovules.
6. Calyx, style and stigma.
7. A lobe of the corol, back view, the thin margins opened out.
8. Fruit.
9. The fruit cut vertically.

2. SAPROSMA FRAGRANS, *Bedd.*—A shrub or small tree 10-12 feet or more, branches dichotomous, leaves glabrous, penniveined oblong to oblongo-lanceolate acuminate attenuated at the base, 3-4 inches long by 1½-2 inches broad; petioles 3 lines long, stipules entire or toothed, peduncles terminal very short bracteolate, pedicels 1-5 ebracteolate about 2 lines long, calyx cup-shaped subentire or slightly 4-lobed ebracteolate at the base, corol infundibuliform, tube very long minutely papillose on the outside slightly villous within, stigma 2-lobed, lobes elongate, fruit oblong. *Bedd. Icones. Pl. Ind. Or. tab.* xiv.

Western slopes of the Nilgiris, 3-4000 feet elevation. A very handsome shrub, flowers very sweet scented, but fetid when crushed.

3. SAPROSMA GLOMERATA, *Gardn.*—A small shrub, branches terete dichotomous, leaves glabrous ovate or elliptic acuminate subsessile, 1½-4½ inches long ½-2 inches broad, penniveined. Stipules connate entire or toothed, flowers few terminal subsessile, calyx with 4-5 acute lobes, corol white infundibuliform 2-3 lines long, anthers included 4-5, stigma with 2 flattened lobes, fruit globose deep

blue very fetid as is the whole plant when crushed. Dysodidendron glomeratum, *Gardn.* Saprosma Indica, *Dalz.* Serissa Gardneri, *Thw.* Serissa glomerata, *Bedd. Icones. Pl. Ind. Or. tab.* xvi.

Very common in the moist forests of all the western part of the peninsula 2000-4000 feet, and in Ceylon.

4. Saprosma corymbosa, *Bedd.*—A shrub 4-6 feet, branches 4 angled, leaves glabrous elliptic acuminate 3-6 inches long by 1-2½ inches broad, penniveined, petioles ¼-½ inch long. Stipules connate toothed, panicles terminal and axillary 2-3 inches long dichotomously branched bracteolate at the ramifications, calyx bracteolate at the base 4-lobed or subentire, corol-tube 3 lines long papillose on the outside, hairy within, obsoletely induplicate, anthers on longish filaments considerably exserted. Stigma with 2 flattened lobes. Serissa corymbosa, *Bedd. Icones. Pl. Ind. Or. tab.* xvii.

Tinnevelly hills, south of Courtallum, 3000-4000 feet; like the other species, very fetid.

5. Saprosma Ceylanica, *Gard.*—A shrub 8-12 feet glabrous, branches dichotomous a little compressed, leaves membranaceous oblong or oblongo-lanceolate acuminate more or less acute at the base shortly petiolate, 2½-6 inches long by ¾-2½ inches broad, petioles 1-3 lines long. Stipules short more or less connate 3-cuspidate deciduous; peduncles axillary and terminal 1-3 flowered much shorter than the leaves, pedicels 2-bracteolate at the apex and base, bracteoles connate, flowers 4-merous. Calyx sinuately 4-toothed; corol infundibuliform minutely pubescent outside, villous in the jaws, the limb 5-7 lines in expansion, fruit bluish-purple ovoid or oblong 4-9 lines long 1-celled 1-2-seeded. Dysodidendron Ceylanicum, *Gard. Calc. Journ. of Nat. Hist. vol. VII.* Serissa, *Thw. En. Pl. Zey. p.* 150.

Ceylon, central provinces.

6. Saprosma scabrida, *Thw.*—A shrub, branches scabrous, leaves elliptic acuminate acute at the base glabrous, 2-3 inches long by ¾-1¼ broad, costa and petiole (3 lines) scabrous. Stipules connate aristato-fimbriate scabrous, flowers terminal sessile, calyx pilose, teeth 4 linear-lanceolate. Serissa scabrida, *Thw. En. Pl. Zey. p.* 151.

Ceylon, near Ratnapoora.

Tribe XII, Pæderieæ.—*Flowers hermathrodite or polygamo-diœcious, corol lobes valvate, stamens inserted in the jaws or on the tube (sometimes near the base) of the corol. Ovary* 2-5*-celled, style branches or stigmas* 2 *or* 5 *filiform papillose, rarely short and obtuse, ovules solitary in the cells erect from the base anatropal. Fruit globose compressed or angled, either a* 5*-angled capsule or dicoccous, the epicarp thin and fragile, the pyrenes free or pendulous from a central column; albumen fleshy scanty or copious, cotyledons broad foliaceous, radicle inferior. Erect or scandent shrubs, fetid when bruised, stipules entire.*

HAMILTONIA. Roxb.

Gen. Char. Calyx-tube ovoid, limb 5-parted, the segments subulate persistent, corol infundibuliform, the tube long and straight, the lobes 5-4 short oblong valvate, stamens 5 inserted into the jaws of the corol, filaments short subulate, anthers fixed by the back below the middle included obovato-oblong, disk cushion-like. Ovary 5-sulcated the exocarp free from the 5-celled endocarp, the partitions soon disappearing so that it appears as if 1-celled, style filiform 5-cleft at the apex, the branches linear truncate or obtuse, ovules solitary in the cells erect from the base anatropal. Capsule dehiscing at the apex into 5 valves, 5-seeded, seed oblong triquetrous covered with a dry reticulated net like membrane, embryo erect, cotyledons foliaceous cordate, radicle terete inferior. Shrubs hispid or glabrous, leaves opposite petioled fetid when bruised ovato-lanceolate, stipules short acute broad at the base persistent, flowers sweet scented blue or white in terminal trichotomous panicles, fruit small. *Roxb. Fl. Ind.* i. 554. Spermadictyon, *Roxb. Cor. Pl.* iii. 32, *t.* 236.

1. Hamiltonia suaveolens, *Roxb.*—A large shrub or small tree, leaves lanceolate or ovato-lanceolate acute quite glabrous or more or less hirsute on both sides, penniveined, 5-8 inches long by 1½-3 inches broad, petioles 3-9 lines long. Stipules triangular from a broad base pointed, flowers pale blue or white very fragrant (fetid if crushed, as are all the parts) in terminal panicles, congested or subumbellate at the apices of the branchlets, bracts and bracteoles subulato-lanceolate. Calyx 5-cleft, segments subulate, corol lobes 5-4. Stamens always 5, the rest as in the generic character, fruit size of a pea. *Roxb. Fl. Ind. ed. Wall.* ii. 223. H. Mysorenis, *WA. Prod.* 423.

I have specimens of this beautiful shrub from the Goomsoor forests (1000 feet elevation), the Myhendra hill near Berhampore (4300 feet), Jubbulpore, the Nallay Mallays (Kurnool district) and Mysore; the plant from the Kurnool hills has the panicles more lax and the flower nearly glabrous, but does not otherwise differ.

Analysis, Pl. XVII, fig. 3.

1. A flower bud, the corol-lobes valvate.
2. A flower with only 4 corol-lobes.
3. A calyx.
4. A 5-lobed corol removed and opened to show the 5 stamens.
5. Anther, back view.
6. Anther, front view.
7. Portion of a 4-lobed corol opened to shew that it has 5 stamens.
8. Ovary cut vertically, shewing the erect ovules, (the transverse section shows 5 cells when very young, but the partitions soon disappear and the advanced ovary and the fruit are 1-celled), the style and 5-lobed stigma.
9. Style and stigma (in the plate it appears only 4 but should be 5-lobed.)

Tribe XIII, Octotropideæ.—*Corol-lobes contorted, ovary* 1*-celled, ovules solitary or twin pendulous.*

OCTOTROPIS. Bedd.

Gen Char. Calyx-tube short turbinate obconical, limb erect shortly 5-toothed persistent, corol campanulate hairy in the jaws, lobes 5 ovate about ½ as long as the tube patent, contorted in the bud, stamens as many as corol-lobes and inserted between them in the

jaws, anthers exserted, sessile long-linear deeply sagittate at the base, apiculate at the apex, fixed by the back near the base, disk tumid, ovary 1-celled, style stout exserted 8-keeled or almost winged, the keels ciliate, stigma shortly bifid glabrous, the lobes ovate acute, ovules 1-2 pendulous from the apex of the cell, fruit (immature) oblong coriaceous about 6 lines long crowned by the remains of the calyx, indehiscent ? A glabrous shrub, branches terete, leaves opposite from ovate or oblong to elliptic with a long fine acumination, the primary veins 6-7 on each side much looped towards the margin, veinlets reticulated. Stipules interpetiolar triangulari-ovate with a longish acumination persistent, flowers in axillary or supra-axillary loose puberulous corymbose panicles which are about $\frac{1}{3}$ or $\frac{1}{2}$ as long as the leaves, bracts and bracteoles minute subulate.

1. Octotropis Travancorica, *Bedd.*—A large shrub, leaves glabrous 5-6 inches long by $1\frac{1}{4}$-3 inches broad, petioles 2-3 lines long, flowers white 6-7 lines in expansion, the tube about 3 lines long.

Travancore hills, 3000 feet. Chokampatty hills (Tinnevelly) 3500 feet.—See Pl. cccxxvii.

Analysis.

1. A flower bud, corol-lobes contorted.
2. A full flower, anthers exserted.
3. The 5-lobed corol opened out, hairy in the jaws, stamens 5 sessile.
4. Anthers, front and back view, sagittate at the base, furnished with a long apiculation at the apex.
5. A vertical section of a flower from which the corol has been removed, shewing the single celled ovary with 1 pendulous ovule, the disk, style and stigma.
6. Vertical section of an ovary shewing 2 pendulous ovules.
7. The style much magnified, shewing the 8 ciliate sulcations or wings.
8. Nearly ripe fruit (life size.)
9. A fruit magnified.

Vaucdc del

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Octotropis Travancorica. (Bedd.)

See Manual under Rubiaceæ.

ORDER XLVII—COMPOSITÆ.

Flowers or florets collected together in a head (rarely reduced to a single floret), surrounded by an involucre of several bracts, either in one row or imbricated in several rows, the whole having the appearance of a single flower. Receptacle on which the florets are inserted either naked or bearing chaffy scales or hairs or bristles between the florets. In each floret the calyx is wanting or converted into a pappus or ring of hairs or scales on the top of the ovary. Corollas either all hermaphrodite, tubular, and 5-or rarely 4-toothed (heads discoid), or all hermaphrodite and ligulate, that is, with a slender tube and a flat strap-shaped lamina, or those of the centre or disk tubular and hermaphrodite or male, and those of the circumference either ligulate and female or neuter, forming a ray (heads radiate), or filiform and female (heads discoid but heterogamous). Stamens 5, rarely 4, inserted in the tube of the corolla, the anthers linear and united in a sheath round the style (except in Xanthium, or where more or less imperfect), 2-celled, opening inwards by longitudinal slits, the connective usually produced at the top into a small erect appendage, the anther obtuse or sagittate at the base, the basal lobes sometimes prolonged into short and acute or long very fine and hair-like points or lobes called tails. Ovary inferior, with a single erect ovule. Style filiform, usually divided at the top into two short stigmatic branches. Fruit a small dry seed-like nut or *achene*, crowned by the pappus or naked. Seed erect, without albumen. Embryo straight or rarely curved. Radicle inferior. Herbs, shrubs or very rarely trees, with alternate or opposite leaves, without stipules. Flower-heads terminal or very rarely axillary, solitary or in panicles usually corymbose, sometimes reduced to clusters or compound heads, the general inflorescence often centrifugal, the inflorescence within the head always centripetal.

This is the largest Order in the vegetable kingdom, but with three exceptions, all its representatives in Southern India are weeds, herbs or undershrubs not coming within the scope of this Flora; the Order therefore is of no importance whatever to the forester.

Tribe Vernoniaceæ.—Leaves alternate, flower-heads discoid, the florets all tubular hermathrodite and regular or nearly so, involucre imbricate, anthers usually obtuse at the base without tails. Style branches subulate and acute not swollen at the base.

Flowers heads on separate peduncles.	
Involucre with several florets	VERNONIA.
Involucre with only 1 floret	MONOSIS,

VERNONIA. SCHREB.

For Gen. Char. see letter-press to Plate ccxxv.

1. VERNONIA VOLKAMERIÆFOLIA, *DC.*—For description, &c. see Pl. ccxxv.

2. VERNONIA JAVANICA, *DC.*—A large tree 50-60 feet high, young branches fusco-tomentose, leaves elliptic acuminate rounded at the base entire glabrous above, fusco-tomentose beneath, 6 inches long by 2½-3 broad, petioles 1½ inch long. Corymbs terminal panicled divaricate, the lateral branches elongate 3 inches and more long, scales of the involucre oval-oblong obtuse imbricate villous on the back, pappus with the outer row of bristles few or scarcely any. *DC. Prod.* v. 22. Eupatorium Javanicum, *Blume Bijdr.* 903. Leucomeris Javanica, *Blume.*

Ceylon, not uncommon at the margins of moist forests up to 5000 feet elevation, very abundant in the Ambagamwa district.

MONOSIS. DC.

For Gen. Char. see letter-press to Pl. ccxxvi.

1. MONOSIS WIGHTIANA, *DC.*—For description, &c. see Pl. ccxxvi.

ORDER XLVIII—ERICACEÆ.

Calyx more or less deeply divided into 4 or 5 teeth or lobes, the tube adnate to the ovary or quite free, sometimes exceedingly short. Corolla inferior or superior, the tube ovoid globular elongated or campanulate, the lobes spreading; valvate or imbricate in the bud, or rarely the petals distinct. Stamens twice as many or rarely of the same number as the corolla-lobes, inserted within the corolla but free from it. Anthers 2-celled, opening at the top by 2 separate pores or oblong slits or rarely by 2 slits extending their whole length. Hypogynous disk very small or none. Ovary having usually as many cells as lobes of the corolla, rarely apparently twice as many or reduced to 3 or 2, with 1 or several ovules in each cell, the placentas attached to the axis. Fruit either capsular or succulent and indehiscent. Seeds very small, with a fleshy albumen, the embryo straight, often small. Shrubs, sometimes very low creeping and almost herbaceous, more frequently erect and bushy or growing up into small trees, very rarely true herbs. Leaves entire or toothed, undivided, usually alternate, penninerved or 3 nerved. Flowers either axillary and solitary, or in short clusters or heads, or forming terminal racemes, corymbs, clusters or heads.

An order of very little importance in a forest view. Rhododendron yields 1 *tree on our higher mountains, Vaccinium* 3 *small alpine or subalpine trees, and Gualtheria a small alpine shrub.*

Tribe I, Vaccineæ.—Ovary inferior, fruit succulent indehiscent	VACCINIUM.
Tribe II, Andromedeæ.—Ovary superior, fruit a capsule opening in loculicidal valves	GUALTHERIA.
Tribe III, Rhodoreæ.—Ovary superior, fruit a capsule opening in septicidal valves	RHODODENDRON.

VACCINIUM. Linn.

For Gen. Char. see letter-press to Pl. ccxxvii.

1. Vaccinium Leschenaultii, *Wight.*—For description, &c. see Plate ccxxvii.

2. Vaccinium rotundifolium, *Wight.*—A small tree, much branched, glabrous or the young branches slightly pubescent, leaves orbicular coriaceous glabrous entire or slightly crenulato-serrate, deep green above paler beneath, 1¼-1½ inches each way, racemes axillary and terminal longer than the leaves, flowers pink urceolate 5-lobed, lobes hairy, filaments filiform hairy, bristles of the anthers minute or wanting, fruit the size of a large currant purplish-red when ripe, testa of the seed reticulated. *Wight. Ill. p.* 119. *tab.* 139.

Nilgiris, in moist woods about Ootacamund.

3. Vaccinium Neilgherrense, *Wight.*—A small tree or sometimes only a shrub, glabrous except the very young parts, leaves linear lanceolate serrate acute at the base acuminate at the point, 3¼-4 inches long by 1 inch broad, petioles 1-2 lines long, racemes from shorter to a little longer than the leaves axillary usually confined to the extremities of the branches, flowers white or rose-colored, pedicels 2-4 lines long furnished with a large foliaceous deciduous bracteole, corol-tube ovate contracted at the mouth slightly pubescent, filaments hairy, anthers bristled, tubular points dilated towards the apex. *Wight Icones tab.* 1189. V. affine and V. Donnianum, *Wight*; both answer well to forms of this plant, and are probably not distinct.

Very common on the Nilgiris, Anamallays, Pulneys, Wynad, &c. 2000 to 7000 feet elevation.

GUALTHERIA. Linn.

Gen. Char. Calyx free, deeply divided into 5 segments, enlarged under or round the fruit and then often succulent. Corolla urceolate; lobes 5, short, spreading imbricate in the bud. Stamens 10, hypogynous, included in the corolla-tube; anther-cells opening in a terminal or oblique foramen, each with 2 erect awns (4 to the anther). Ovary 5 celled, with several ovules in each cell; style inserted in a central depression; stigma capitate or peltate. Fruit a globular capsule, opening loculicidally in 5 valves, more or less enclosed in the enlarged usually succulent and berry-like calyx. Seeds small; embryo cylindrical in the centre of the albumen. Erect and bushy or low and creeping shrubs, often hispid with rigid hairs. Leaves penniveined, entire or toothed. Flowers in simple terminal or axillary racemes, each one pedicellate within a bract and 2 bracteoles, or solitary in the axils of the stem-leaves.

1. Gualtheria fragrantissima, *Wall.*—A small shrub glabrous, ramuli subtrigonous, leaves oval or ovato-oblong or obovate obtuse or acute very hard and coriaceous, crenulate glabrous above, rough with scabrous glands beneath from which arise deciduous black hairs, 2-3 inches long by 1¼-1½ broad, petioles 2-3 lines long, racemes axillary solitary pubescent shorter than the leaves, bracts concave acute glabrous 1 under the pedicel and 2 near the flower, flowers small pure white, berries blue. *Wight Icones tab.* 1196. G. Leschenaultii, *l. c. tab.* 1195. Andromeda Kotagherrensis, *Hook. Ic.* 246. Leucothæ Kotagherensis, *DC. Prod.* vii. *p.* 606.

A very common shrub on the Nilgiris and Pulneys and in Ceylon; Carbolic acid has been distilled from it.

Analysis.

1. A raceme (life size).
2. A flower showing the 2 bracteoles below the calyx.
3. Corol removed and opened, the filaments of the 10 stamens adherent to the very base of the tube.
4. Calyx, ovary and style, and the 10 lobed fleshy disk surrounding the ovary, the stamens are alternate with the lobes of this disk.
5. Front, back and side views of the anthers.
6. Ovary cut vertically.
7. Ovary cut transversely.
8. Fruit.
9. Vertical section of the fruit.
10. Transverse section of the fruit. (All drawn from fresh specimens).

RHODODENDRON. Linn.

For Gen. Char. see letter-press to Pl. ccxxviii.

1. Rhododendron arboreum, *Smith.*—For description, &c. see Pl. ccxxviii.

ORDER XLIX—MYRSINEÆ.

Flowers regular. Calyx of 5 or rarely 4 divisions or teeth, free or rarely the tube adnate to the ovary. Corolla regular, more or less divided into as many lobes or teeth or rarely distinct petals as the divisions of the calyx, imbricate and often contorted in the bud. Stamens as many as divisions of the corolla and opposite to them, inserted in the tube or at the base. Ovary 1-celled, with several ovules, usually peltate, attached to or immersed in a central placenta, usually quite free, thick, and globular. Style single, with a terminal capitate or small stigma. Fruit an indehiscent berry or drupe, or very rarely splitting lengthwise on one side. Seeds albuminous (except in Ægiceras.) Trees or shrubs, the foliage and inflorescence usually marked with resinous dots. Leaves alternate, simple, entire or toothed, without stipules. Flowers small, in axillary clusters, racemes or panicles, or rarely in terminal panicles.

An order of no importance to the forester. Myrsine yields 1 *alpine tree (very common on the Nilgiris); Mœsa* 1 *large shrub (alpine or subalpine); Embelia* 1 *shrub or small tree (subalpine), beside* 2 *or* 3 *scandent plants; Samara* 1 *scandent shrub; Ardisia* 4 *small trees or large shrubs; and Ægiceras one small maritime tree or large shrub.*

Ovary wholly or partially inferior ... ... MÆSA.
Ovary superior.
  Petals free to the base.
    Petals and stamens usually 5, racemes slender forming a terminal panicle ... ... EMBELIA.
    Petals and stamens 4, racemes or clusters short axillary ... ... SAMARA.
  Petals united into a short tube with a deeply lobed limb.
    Flowers in axillary clusters ... ... MYRSINE.
    Flowers in umbels.
      Ovary and fruit obtuse, anther cells not divided transversely ... ... ARDISIA.
      Ovary and fruit acuminate, anther cells transversely divided into several pits ... ... ÆGICERAS.

MÆSA. FORSK.

Gen. Char. Calyx-tube adnate to the ovary, the limb 5-lobed. Corolla 5-lobed. Stamens 5, with slender filaments and short anthers. Ovary inferior or half-inferior; style short. Berry crowned by the calyx-lobes or teeth. Trees or shrubs. Flowers small, in simple or compound racemes, either axillary or rarely terminal. Bracts at the base of the pedicels, and 2 bracteoles under the flower usually very small.

1. MÆSA INDICA, *DC.*—A large shrub 8-12 feet, leaves oblong or elliptical acuminate membranaceous coarsely dentate glabrous or pubescent, 2-6 inches long by 1¼ to nearly 2 inches broad, petioles 2-10 lines long, racemes axillary and terminal usually branched rarely simple, 1-2 inches long, bracts lanceolate acuminate shorter than the pedicel, bracteoles ovate acute, flowers white on pedicels about 1 line long, calyx-segments ovate ciliate, corol with a very short tube, the lobes spreading to 2½ lines in diameter, ovary semi-superior, stigma capitate sublobate, berry the size of a grain of pepper more or less succulent whitish, seeds numerous angular. *DC. Prod* viii. 80;—*Wight Icones tab.* 1206. Bæobotrys Indica, *Roxb. Fl. Ind.* (*ed. Wall.*) ii. 230. [M. Sinensis, *DC. l. c.* can scarcely be distinct.]

A most common shrub throughout our western forests from little or no elevation up to 6000 feet; some forms are quite glabrous, others rather densely pubescent, particularly on the under surface of the leaf and the petioles.

Analysis, Pl. XVIII, fig. 4.

1. A portion of a leaf and the axillary inflorescence in bud.
2. A bud and a flower.
3. Corolla opened out, to show the stamens.
4. Ovary and style.
5. Ovary cut vertically.
6. Placenta and ovules.
7. Ovary cut transversely.
8. Anthers, front and back view.
9. Fruit.
10. The same cut vertically.
11. Portion of a branch in young fruit. (All except No. 1 copied from Wight's figure.) No. 1 is from a variety with hairy leaves and sessile inflorescence.

EMBELIA. BURM.

Gen. Char.: Calyx free deeply 5-(rarely 4-) lobed, petals 5 rarely 4 distinct spreading, stamens as many inserted at the base of the petals not longer than them with filiform filaments and short anthers. Ovary superior. Style short. Shrubs or woody climbers, flowers small often polygamous in simple or branched slender racemes either axillary or forming a terminal panicle.

1. EMBELIA ROBUSTA, *Roxb.*—A small tree or large shrub, glabrous or the young branches fusco-pubescent, leaves oblong to oval or sometimes nearly orbicular or obcordate entire membranaceous or subcoriaceous glabrous on both sides or pubescent beneath, often with raised glandular dots particularly near the margin, 2-3 inches long, petioles 3-6 lines long glabrous or fusco-pubescent, racemes axillary and from the old axils below the leaves solitary simple much shorter than the leaves fusco-pubescent, flowers polygamous male and hermathrodite on separate plants, small greenish white fragrant, pedicels 1-1½ lines long furnished at the base with a subulate bract, calyx deeply 5 cleft pubescent, corol 5-petaled revolute 3 times as long as the calyx pubescent often gland dotted, style short, stigma rather large, fruit spherical size of a grain of pepper. *Roxb. Fl. Ind.* i. *p.* 587;—*DC. Prod.* viii. 86. E. basool, *DC. l. c. p.* 87. Embelia tsjeriamcottam, *DC. l. c. p.* 87, *and Wight Icones tab.* 1209.

Common in the Wynad about Sultan's battery, Cochin, and elsewhere on the Malabar coast, also found in Ceylon and Bengal.

Analysis, Pl. XIX, fig 2.

Male 1. A bud,
2. A full flower, petals, stamens and sterile ovary.
3. The same 4 of the petals removed.
4. A petal inside view, showing the stamen inserted on to it a little below the centre
5. Petal outside view, showing the black glands.
6. Anthers.

Hermathrodite 7 & 8. Flowers.
9. The same opened.
10. The same 4 of the petals removed.
11. Anthers, front and back view.
12. A petal showing the stamens inserted on to it near its base.
13. Vertical section of an ovary, showing the thick globular fleshy erect placenta and 2 ovules embedded in

2. Embelia ribes, *Burm.* (E. glandulifera, *Wight Icones* 1207 —is a scandent shrub common on the Nilgiris, Pulneys, &c., and Ceylon, up to 5000 feet elevation.

3. Embelia Gardneriana, *Wight Icones* 1208—is a scandent plant, Nilgiris, western slopes and Anamallays; and I have a 4th species, a very large climber, with thick leathery leaves 6 inches long and very large terminal panicles, which is probably an undescribed species, I have only found it in the forests of the Bolumpatty valley (Coimbatore hills); the panicles and young leaves are quite pink and the petals and anthers gland dotted, the young branches very warty.

SAMARA. Linn.

Gen. Char.: The same as Embelia, except that the flowers are constantly tetramerous, and the stamens longer than the petals. Scandent shrubs, flowers in short axillary racemes.—Choripetalum, *DC.*

Samara viridiflora, *DC.* (Choripetalum viridiflorum, *DC.* viii. 88; C. aurantiacum, *DC. l. c.*; *Wight Icones, tab.* 1210; Samara Rheedii, *Wight Icones tab.* 1591)—is a common scandent shrub in our western forests, and is also found in Ceylon and Java; it is the only plant of the genus in S. India, and scarcely comes within this Flora, being only a climber.

MYRSINE. Linn.

For Gen. Char. see letter-press to Pl. ccxxxiv.

1. Myrsine capitellata, *Wall.*—For description, &c. see Pl. ccxxxiv.

ARDISIA. Linn.

Gen. Char. Calyx free 5-lobed, corol deeply 5-lobed, the lobes usually very spreading or reflexed and convolute in the bud, often gland dotted, stamens as many, filaments short, anthers lanceolate erect, the slits of the cells often not reaching the base, ovary superior, style subulate usually long and persistent, the stigma not enlarged, berry or drupe globular. Trees, shrubs or very small under-shrubs, flowers white or pink rather small in umbels or very short umbel-like racemes, axillary or terminal either solitary or several together in branching panicles, leaves often gland-dotted.

Not a genus of any importance to the forester.

1. Ardisia pauciflora, *Heyne.*—An erect very small tree or large shrub, glabrous except the young parts which are more or less furnished with ferruginous scales, leaves coriaceous often gland-dotted lanceolate obtusely acuminate entire or crenate, 2-5 inches long by 1-1¾ inch broad, veins scarcely prominent joined in a waved marginal vein, petioles 2-6 inches long, peduncles axillary and terminal rather slender ½ to 1½ inches long bearing sometimes 3-4 umbels of 4-8 small white flowers, pedicels slender 2-3 lines long slightly elongated in fruit, calyx-lobes very small glabrous or puberulous gland-dotted, corol-lobes glabrous about 1 line long and very acute gland-dotted, fruit 3-4 lines in diameter. *DC. Prod.* viii. 127;—*Wight Icones, tab.* 1214.

Very common throughout our western forests, also in Ceylon, Bengal, Java, and Hong Kong. One variety from the Travancore hills (which I cannot separate) has the leaves prominently crenated, but all my other examples have them quite entire.

2. Ardisia rhomboidea, *Wight.*—A small tree, leaves rhomboidal acuminated, attenuated at the base into the petiole, glabrous slightly crenulately undulated on the margin, 1½-3 inches long by 6-8 lines broad, petioles scarcely more than the winged base of the leaf, peduncles axillary about 6 lines long, umbellately 3-flowered at the apex, pedicels about 3 lines long, bracts lanceolate acute, calyx-segments ovate subciliate, corol-lobes ovate acute about 1½ lines long, fruit globose 2-2½ lines in diameter. *Wight Icones ab.* 1213.

Common on the Anamallays and Travancore and Tinnevelly ghats, 2-4000 feet elevation.

3. Ardisia paniculata, *Roxb.*—A small tree or large shrub, leaves lanceolate to spathulate or cuneate, oblong, short petioled or nearly sessile with a dilated amplexicaul petiole obtusely pointed, entire glabrous 6-12 inches long 3-5 inches broad, panicles terminal very large, branchlets often compound glandularly puberulous, flowers numerous pretty large rose-colored, bracts oblong, calyx-segments broad ovate black dotted puberulous, corol-lobes ovate about 3 lines long often with glandular black dots, anthers sagittate very acute. *Roxb. Fl. Ind.* i, *p.* 580. A. Courtallensis, *Wight Icones tab.* 1215.

Not uncommon in our western forests from Canara down to Cape Comorin, also in Ceylon and Bengal. My South Canara specimens have the leaves almost sessile with a much dilated stem-clasping petiole.

4. Ardisia elliptica, *Thunb.*—A small tree or large shrub, leaves rather succulent glabrous glossy oblong or cuneate-oblong, acute entire almost veinless, 4-6 inches long by 2-3 inch broad, petioles 2-5 lines long, peduncles axillary and terminal umbelliform shorter than the leaves, often drooping very rarely branched, pedicels thick, bracts concave, flowers rather large rose-colored calyx-

segments roundish, corol fleshy, tube scarcely any, lobes spreading at length often revolute, fruit 3-6 lines in diameter black when ripe. *Thunb. Nov. Gen. pars.* 8 ;—*DC. Prod*, viii. 138. A. solanacea, *Roxb. Fl. Ind.* i. 580. A. umbellata, *Roxb. l. c. p.* 582. A. humilis, *Wight Icones* 1212 (not *Vahl.*) A. polycephala, *Wight Ill. tab.* 145.

Very common throughout the presidency, both eastern and western side, also in Ceylon, Bengal, and the Archipelago.

5. A. DIVERGENS, *Roxb. Fl.* i. 583.
6. A. WALLICHII, *DC. Prod.* viii. 137.
7. A. HUMILIS, *Vahl. Symb.* iii. *p.* 40.
8. A. SERRATIFOLIA, *Bedd. Icones tab.* cxiii.
9. A. AMPLEXICAULIS, *Bedd. Icones tab.* clxx.

} are undershrubs found in this Presidency and Ceylon.

Analysis, Pl. XVIII, fig 3.

ARDISIA AMPLEXICAULIS.

1. A flower.
2. Corolla and stamens.
3. A lobe of the corolla and the attached stamen.
4. Ovary and calyx.
5. Ovary cut vertically, showing that it is 1-celled with several ovules attached to the basal placenta.
6. A fruit.

ÆGICERAS. GÆRTN.

Gen. Char. Calyx free, 5-cleft, corolla with 5 spreading lobes. Stamens with subulate filaments ; anthers lanceolate, the cells divided transversely into several pits. Ovary superior ; style subulate, acute ; stigma terminal, very small. Fruit cylindrical, incurved, opening as the seed grows in one or two longitudinal slits. Seed without albumen ; cotyledons thick and fleshy. Maritime trees or shrubs, with the habit of Rhizophora, and, as in those trees, the seed germinates before the fruit falls off. Flowers white, in umbels or in very short umbel-like racemes, axillary or terminal.

ÆGICERAS MAJUS, *Gærtn.*—A glabrous shrub or small tree. Leaves obovate, very obtuse, 2 to 3 inch long, quite entire, narrowed into a petiole at the base, coriaceous and evergreen. Umbels axillary and terminal, nearly sessile. Pedicels stiff, 3 to 5 lines long. Calyx nearly 3 lines long, with very obtuse stiff much-imbricate segments, closely covering the tube of the corolla, which is about their length. Corolla-lobes about the same length, spreading or reflexed, stiff and very acute. Stamens shortly exserted. Ovary very acute, growing out into a curved hornlike fruit. *Wight Illus. tab.* 146. *Æ.* fragrans, *Kœn. R. Br. Prod.* 534.

This small milky tree, with white fragrant flowers, is very common about tidal backwaters on our western coast from Bombay down to Cape Comorin, and in Ceylon, it also inhabits the Archipelago, Australia and the South Pacific Islands.

Analysis.

1. A bud, showing imbricate calyx.
2. A full flower.
3. Corolla opened showing the filaments of the 5 stamens joined in a short tube which is adnate to the bottom of the tube of the corolla.
4. The imbricate calyx opened to show ovary and style.
5. A calycine segment.
6. Anthers, front and back view.
7. Ovary cut vertically, showing the globular thick fleshy erect placenta and ovules.
8. Ovary cut transversely.
9. Young fruit.

ORDER L—SAPOTACEÆ.

Flowers regular. Calyx free, of 4 to 8 imbricate segments. Corolla more or less divided into as many or rarely twice as many lobes. Perfect stamens either as many as corolla-lobes (or as the inner ones when the lobes are in several series) and opposite to them, or rarely twice as many, besides which there are frequently small scales (or staminodia ?) alternating with the lobes of the corolla, or staminodia alternating with the perfect stamens. Ovary superior, 2-or more celled, with 1 ovule in each cell, erect pendulous or laterally attached. Style simple, with an entire or very slightly lobed stigma. Fruit a berry or drupe, usually indehiscent. Seeds either with a fleshy albumen and flat cotyledons or without any albumen but with thick fleshy cotyledons. Radicle short, inferior. Trees or shrubs, with the juice very frequently milky. Leaves alternate, entire, without any (or with small very deciduous ?) stipules. Flowers axillary, solitary or clustered. Bracts small or none.

This is an order of considerable importance to the forester. Bassia is represented by 5 *trees in this Presidency,* 2 *of which are also common to Ceylon, and by* 11 *trees peculiar to Ceylon ; they are mostly valuable timbers. Mimusops gives us* 3 *species, all common trees and valuable timbers. Achras is represented by* 2 *and Chrysophyllum by* 1 *mountain tree, and all three yield serviceable timbers.*

Calyx segments 4-6, corol-lobes 5-14, no scales or stamiodia, exalbuminous	BASSIA.
Calyx segments 6-8, corol-lobes twice or thrice as many with petaloid staminodia, albuminous ...	MIMUSOPS.
Calyx segments, stamens and corol-lobes 5-6, with small scales, albuminous	ACHRAS.
Calyx segments, stamens and corol-lobes 5, no scales or staminodia, albumen none or scanty ...	CHRYSOPHYLLUM.

BASSIA. Linn.

For Gen. Char. see letter-press to Pl. xli.

SECTION BASSIA.—Calyx 4-6 parted, corol 6-12 lobed, anthers in 2-3 series, subsessile.

* *Calyx 4-lobed.*

1. Bassia latifolia, *Linn.*—For description, &c. see Pl. xli.

2. Bassia longifolia, *Linn.*—For description, &c. see Pl. xlii.

3. Bassia Malabarica, *Bedd.*—A good sized tree, glabrous except the inflorescence, leaves very coriaceous dark green and shining, oblong to lanceolate obtuse attenuated at the base, 4-7 inches long by about 1½ in broad, petioles 4-6 lines long, peduncles crowded axillary or at the axils of fallen leaves 4-8 together, 1-1¼ inch long; calyx 4-parted in 2 series, segments obtuse the 2 inner more membranaceous and adpresso strigose, the outer ones nearly glabrous, corol 6 (rarely 7) lobed, lobes oblong rufo-strigose on the outside. Stamens 16-18 in 2 series, filaments hairy very short crowded and close to each other and hid in the dense matted hair on the corol tube, anthers with the connective produced into a long subulate entire (rarely 2-cleft) acumen, ovary 6-celled, style much longer than the corol, ovules attached to the axis above the centre.

This tree is abundant on the banks of streams in S. Canara, Malabar and the Anamallays up to 4000 feet elevation, it yields abundance of milky juice similar to Bassia elliptica.

* * *Calyx 6-lobed.*

4. Bassia elliptica, *Dalz.*—For description, &c. see Pl. xliii.

SECTION DASYAULUS. *Thw.*—Calyx 4-parted, corol 5-8 lobed, anthers in 1-series, double as many as lobes of corol, subsessile.

5. Bassia neriifolia, *Moon.*—A middling sized tree, leaves glabrous narrow oblong—lanceolate obtuse narrowed at the base into a short petiole, 3-8 inches long by ½ to 1 in broad, fascicles 2-6 flowered crowded towards the apices of the branches, pedicel glabrous 1½ inches long. Calyx 4 lines long 4-parted the interior segments sericeo-strigose on the back, corol 6-parted to the middle. Stamens 12 in a single series subsessile, ovary 6-celled, fruit oblong acute 1-seeded 1¼ inches long.—Dasyaulus neriifolius, *Thw. En. Pl. Zey. p.* 175.

Ceylon, common on the banks of rivers and streams in the warmer parts of the island, called Gang mee. For dissections see Pl. ccliv.

6. Bassia microphylla, *Hook.*—A tree, leaves coriaceous obovate obtuse glabrous on both sides, in the ordinary form about 1 inch long and 8 lines broad, but sometimes much larger, peduncles axillary 1-3 together erect, ½ as long as the leaf, calyx 4 parted, lobes ovate obtuse the 2 exterior sericeous, corol deeply 6-(rarely 5-) cleft shorter than the calyx, the tube hispid on both sides, lobes obovate, stamens 10-12 in a single series subsessile, style scarcely longer than the calyx. *Hook. Ic.* 1 *t.* 74. Bassia parviflora, *DC. Prod.* viii. *p.* 198. Dasyaulus microphyllus, *Thw. En. Pl. Zey. p.* 175.

7. Bassia Moonii, *Thw.*—A tree, young branches fulvo-tomentose, leaves glabrous oblong obtusely acuminate or retuse subacute at the base, 3-7 inches long by 1¼-3 inches broad, petiole ½-¾ inch long, peduncle in fascicles of 2-5 about as long as the petiole. Calyx 4-parted, corol 6-lobed, fruit oblong acute 1½ inch long.—Dasyaulus Moonii, *Thw. En. Pl. Zey. p.* 176.

Ceylon, Caltura, Ratnapoora.

8. Bassia fulva, *Thw.*—A middling sized tree, the young branches and young leaves densely clothed with fugacious fulvous tomentum, leaves obovate oblong retuse at the apex or with a very short sudden point, narrowed at the base, 4-7 inches long by 1½-3 broad, petioles ¾ inch long, peduncles 1¼-1½ inch long, 6-8 fascicled in the axils or at the axils of fallen leaves, calyx 4-parted in 2 series, segments 3-4 lines long, ovary 6-celled, style more than double as long as the calyx.—Dasyaulus fulvus, *Thw. En. Pl. Zey. p.* 176.

Ceylon, Hewesee in the Pasdoon Corle.

SECTION DICHOPSIS. *Thw.*—Calyx 6-parted, segments in 2 series, corol 6-lobed, stamens 12 in 1 series the 6 opposite the corol lobes in longer filaments (subextrorse), the others subintrorse, connective 2-parted at the apex, ovary 6-celled.

9. Bassia petiolaris, *Thw.*—A large tree, leaves glabrous ovate with rather an abrupt short acumen, acute at the base, 3-5 inches long 1½-3 inch broad, petiole 1½ inch long, fascicles 2-5 flowered axillary crowded at the apices of the branches fulvo-tomentose, the peduncles about as long as the petioles. Calyx 6-parted in 2 series, segments 4 lines long, corol 6-lobed white 7 lines long, the tube pilose within, stamens 12 on short filaments all fertile in one series, the alternate longer ones opposite the lobes of the corol (with the anthers subextrorse,) the others with scarcely any filaments (subintrose), anthers divaricately 2-horned at the apex, ovary 6-celled, fruit subspherical 1½ inches in diameter, 1-seeded.—Dichopsis petiolaris, *Thw. En. Pl. Zeyl. p.* 176. For dissections see Pl. ccliv.

Ceylon, Ambagamwa district and the Hinidoon and Reigam Corles.

SECTION ISONANDRA. *Wight.*—Calyx and corol lobes equal in number, stamens twice as many in a single series on longish filaments, anthers extrorse acuminate at the apex.

* *Calyx 4-parted.*

10. Bassia Wightiana, *DC.*—A small or middling sized tree glabrous or the young parts occasionally densely fulvo-tomentose, leaves most variable in shape and size from nearly orbicular or obovate to narrow lanceolate, 1½ inch long to 14 inches in some of the lanceolate leaved varieties, acuminate or quite obtuse at the apex, glabrous on both sides or rather densely fulvo-tomentose beneath, membranaceous to coriaceous, primary veins prominent beneath and the areoles between beautifully subparallel venose, petioles 2-6 lines long, flowers very small 2-4 lines long, fascicled in the axils or at the axils of the fallen leaves 2-12 together, pedicels very short or scarcely any. Calyx and corol 4-lobed, the former more or less hairy, ovary 4-rarely 6-celled, fruit oblong about ½ inch long more or less apiculate, red when ripe, 1-2 seeded, seed brown shining.—Isonandra, *DC. Prod.* viii. 187. Isonandra Perottetiana, *Wight Icones.* 1219. I. Candolleana, *Wight Ic.* 1220. I. lanceolata, *Wight Ic.* 359. I. villosa, *Wight Ic.* 360.

This tree is most abundant throughout our western forests and in Ceylon, from somewhat below 2000 feet elevation up to 6000 ; it is most variable in its foliage, but with many years observation I have no hesitation, (as proposed by Dr. Thwaites,) in uniting all Dr. Wight's species ; in fact they run so one into another that they cannot be classed as varieties, except perhaps the form with the leaves fulvo-tomentose beneath, which is rare (only observed by me on the Tinnevelly mountains), but this form has the leaves sometimes lanceolate.

** *Calyx 6-parted.*

11. Bassia grandis, *Thw.*—For description, &c. see Plate ccliv.

12. Bassia rubiginosa, *Thw.*—A very large tree, leaves coriaceous elliptic obovate or obovato oblong, subacute or rounded at the apex, narrowed at the base, beneath densely rubiginoso-pilose, 2½-7 inch long by 1¾-3 inch broad, petiole ½-¾ inch long convex above, fascicles 6-10 flowered adpressedly rubiginoso-pilose, pedicels from as long to 2-3 times as long as the petioles, calyx 4 lines long, 6-parted, corol 6-lobed, stamens 12 in one series, ovary 6-celled, fruit ovoid.—Isonandra rubiginosa, *Thw. En. Pl. Zey.* 177.

Ceylon, Saffragram district and Hinidoon Corle, up to 4000 feet elevation.

13. Bassia canaliculata, *Thw.*—A middling sized tree, leaves glabrous oblong shortly acuminate rounded or subacute at the base, the costa channelled on the upper side, 3-11 inches long by 1¼-4½ broad, petiole channelled, 1-1¾ inch long, fascicles 4-6 flowered adpressedly fulvo-pilose, pedicels as long or ½ as long again as the petioles, calyx 6-parted 4 lines long, corol 6-parted, stamens 12 in one series. Ovary 6-celled, fruit ovoid.—Isonandra canaliculata, *Thw. En. Pl. Zey. p.* 177.

Ceylon, Caltura district.

14. Bassia pauciflora, *Thw.*—A middling size tree, leaves glabrous oblong shortly acuminate, acute at the base, the costa channelled above, 3-8 inches long by 1-3 inch broad, petiole channelled, ½-1 inch long, fascicles few at the apices of the branches 2-3 flowered, pedicels very short, calyx 6-parted 1½ lines long, corol 6-lobed, stamens 12 in a single series, ovary 3-4 celled, fruit oblong.

Ceylon, near Ratnapoora at no elevation.

15. Bassia lævifolia, *Thw.*—A middling sized tree, the branches, petioles and inflorescence adpressedly fusco-pilose, leaves glabrous smooth and shining on both sides, oblongo-lanceolate obtuse narrowed at the base into the short petiole, 2-6 inches long, by ¾-2 inch broad, petiole convex above 2-3 lines long, fascicles 4-6 flowered, axillary solitary or twin at the apex of the branches, pedicels as long or a little longer than the petioles, calyx 6-parted, 1½ line long, corol 6-parted, anthers 12 pilose at the apex, ovary 6-celled, fruit oblong acute.—Isonandra lævifolia, *Thw. En. Pl. Zey. p.* 177.

Ceylon, Saffragram district and Reigam Corle at no great elevation.

16. Bassia lanceolata, *Thw.*—A middling sized tree, young parts and inflorescence adpressedly ferrugineo-pilose, otherwise glabrous, leaves lanceolate or oblongo-lanceolate obtusely acuminate, subcoriaceous, acute at the base, inconspicuously venose beneath, 3-5 inches long 7-14 lines broad, petiole 1 inch long, fascicles 3-6 flowered, pedicels about as long or shorter than the petiole, calyx 4 lines long.—Isonandra lanceolata, *Thw. En. Pl. Zey. p.* 442.

Ceylon, near Caltura.

MIMUSOPS. Linn.

For Gen. Char. see letter-press to Plate xl.

1. Mimusops elengi, *Willd.*—For description, &c. see Plate xl.

2. Mimusops hexandra, *Roxb.*—A good sized tree, branches glabrous, leaves hard and very coriaceous obcordate oval or orbicular very obtuse emarginate glabrous deep green and shining 1½-5 inches long by 1½ 2 broad, petioles round ½-1½ inches long, fascicles 2-8 flowered axillary, pedicels glabrous reflexed shorter than the petioles, lobes of the calyx reflexed, 3 exterior ones coriaceous ovate acute glabrous on both sides, subvelutinous on the margin, 3 interior ones narrower ovate whitish on the back, corol about the length of calyx, exterior lobes reflexed, interior erect, petal-like staminodia glabrous deeply bifid, stamens 6-8, fruit oval size on an olive. *Roxb. Fl. Ind.* ii. 238. M. Indica, *DC. Prod.* viii. 205, and *Wight's Icones tab.* 1587.

A most valuable timber tree, abundant in the Cuddapah, North Arcot, and Kurnool forests, and on the Eastern ghats, Godavery forests, &c., also found but less common in our western forests and Ceylon; it is called Khirni in Hindostanee, and Pàlà in both Tamil and Telugu (a name also given to Alstonia scholaris, Wrightea tinctoria, and other trees); it flowers in April and May. The wood is very heavy, weighing 84 to 92 lbs. per cubic foot when unseasoned, and 70 lbs. when seasoned, and its specific gravity is 1·120, it is close and even-grained, hard, compact and durable, of a purplish color when fresh, turning to reddish-brown and susceptible of a very high polish. It is used by natives for oil presses, building, and a variety of other purposes; it is excellent for rulers, handles of instruments, and all articles of turnery, and for cabinet purposes.

3. Mimusops Roxburghiana, *Wight.*—A good sized tree, leaves oval oblong or obovate obtuse at both ends or sometimes slightly cordate or unequal sided at the base, glabrous 2½-3¼ inches long by 1½-2 broad, petioles 6-8 lines long, fascicles 2-3 flowered axillary, pedicels filiform about 3 times as long as the petioles, calyx 6-8 lobed, lobes ovate acute hoary about the length of the corol, lobes of the corol lanceolate acute, stamens 6-8, petal-like staminodia about as long as the filaments broad and truncate or sub 2 lobed at the apex, jagged on the margins and at the apex, ovary 6-8 celled, fruit globose depressed above 8-9 lines in diameter, about 6 seeded. *Wight Icones tab.* 1588.

This is a very common tree in the jungles about the foot of the Nilgiris and Anamallays, and elsewhere in our western forests, but I never saw it on the eastern side of the Presidency; its timber is used for house building and a variety of purposes by the natives, and for gun stocks; it weighs 48 lbs. the cubic foot when unseasoned and 60-64 lbs. when seasoned, and its specific gravity is ·768, it is rather coarse grained, but strong, fibrous and durable, works kindly with a smooth surface, is reddish-brown in color and superior to teak in strength; in S. Canara the tree is called Renga, and in Tamil (Madura district) Kanu pala.

ACHRAS. Linn.

For Gen. Char. see letter-press to Pl. ccxxxv.

1. Achras elengioides, *DC.*—For description, &c. see Pl. ccxxxv.

2. Achras tomentosa, *Roxb.*—A tree unarmed or with a few blunt thorns, young parts with rusty pubescence, leaves scarcely coriaceous, glabrous in age except the costa, oval to oblong with a blunt short point, a little waved at the margins, 4-5 inches long by 2 inches broad, petioles 4 lines long downy, flowers axillary in fascicles of about 4 together, pedicels 3-4 lines long with a narrow ovate acute bract at the base of each, calyx rusty pubescent about 3 lines long, the 3 outer segments larger than the 2 inner, corol white twice as long as the calyx, petaloid-scales (or staminodia) broad-ovate acute as long as the stamens hairy on the inside, anthers apiculate basifixed extrorse, ovary hairy 5-celled, ovules attached to the centre of the axis, style considerably longer than the corol, stigma small truncate hairy.—Sideroxylon tomentosum, *Roxb. Fl. Ind.* i. 602.

I have only lately procured flowering specimens of this tree from the forests of Western Mysore; the fruit is said to be ovate and about the size of an olive. The tree flowers in March, and is called Hoodigolla (Canarese) in the Mysore district; it is easily distinguished from A. elengioides by its much larger and broader and more prominently veined leaves, and by its blunt thorns; the flowers in both are very similar. If it is Roxburgh's species, it also occurs on our eastern mountains.

3. Achras sapota, *Linn.*, has been introduced into this Presidency from Jamaica; it yields the fruit known as the Sapota.

CHRYSOPHYLLUM. Linn.

For Gen. Char. see letter-press to Pl. ccxxxvi.

1. Chrysophyllum Roxburghii.—For description, &c. see Pl. ccxxxvi.

A foreign species of Chrysophyllum, a middling sized tree, has been introduced into Madras gardens, and one species of Sideroxylon (which is not a S. Indian genus) is also an introduced tree at Madras.

ORDER LI.—EBENACEÆ.

Flowers regular, usually diœcious, calyx free, 3 to 5-lobed or rarely with 6 or 7 lobes. Corolla-lobes as many as those of the calyx, imbricate in the bud, usually contorted. Stamens inserted at the base of the corolla or on the torus within it, indefinite, usually from 10 to 20 in the males, fewer and sterile in the females; anthers erect, linear or lanceolate, the cells opening in longitudinal slits. Ovary free, 3 or more celled, with 1 or 2 pendulous ovules in each cell. Styles as many or half as many as cells, distinct or united into a simple or 2-cleft style, with small terminal stigmas. Fruit a berry, usually indehiscent. Seeds few, albuminous; radicle superior; cotyledons foliaceous. Trees or shrubs, the juice not milky. Leaves alternate, entire, without stipules. Flowers axillary, the females often solitary, the males usually clustered or in small cymes.

This order is an important one as it yields the different species of Ebony. The genus Diospyros is a large one, and species are to be met with in almost every jungle and forest in the Presidency up to about 4000 feet elevation; there are in all 30 species known within our limits, 20 of which are found in S. India and the other 10 are confined to Ceylon. The best ebony comes from D. ebenum and exsculpta, the former is most abundant and on both sides of this Presidency, the latter I have only observed on the eastern and central parts. The beautiful Calamander wood of commerce is the produce of D. quæsita, a species confined to Ceylon, which might however be introduced into this presidency. The genus Maba only yields one species, a small tree or shrub, and the genus Macreightea is as far as we yet know, confined to Ceylon, where it is represented by 3 trees. The genus Holochilus (probably not distinct from Macreightea) yields 1 tree, of which the female only has been found. All the 4 genera are very closely allied, and except for convenience sake might well be united.

Calyx and corol lobes 4-5 (rarely 6), ovary cells 4-8 rarely more, with 1 ovule in each cell	DIOSPYROS.
Calyx and corol lobes 3 each, ovary cells 6, 1 ovule in each cell	MACREIGHTEA.
Calyx truncate entire, ovary cells 6, 1 ovule in each cell	HOLOCHILUS.
Calyx and corol lobes and ovary cells 3 each, with 2 ovules in each cell	MABA.

DIOSPYROS. LINN.

For Gen. Char. see letter-press to Pl. lxv.

1. DIOSPYROS EBENUM, *Retz.*—For description, &c. see Pl. lxv.

2. DIOSPYROS EXSCULPTA, *Ham.*—For description, &c. see Pl. lxvi.

3. DIOSPYROS WIGHTIANA, *DC.*—For description, &c. see Pl. lxvii.

4. DIOSPYROS CALYCINA, *Bedd.*—For description, &c. see Pl. lxviii.

5. DIOSPYROS EMBRYOPTERIS, *Pers.*—For description, &c. see Pl. lxix.

6. DIOSPYROS SYLVATICA, *Roxb.*—A middling sized tree, glabrous except the inflorescence, which as well as the young parts is generally minutely puberulous, leaves (turning black in drying) elliptic-oblong acuminate at the apex and attenuated at the base, 4-5 inches long by 1¼-2 broad, petioles 2-3 lines long, male peduncles about as long as the petiole with a caducous bract at the base, 6-10 flowered, pedicels very short, calyx and corol 3-4 lobed, the latter 2-3 times as long as the former, anthers 13-22, filaments inserted on the globose torus single and double mixed, no rudiment of an ovary; female flowers solitary on short peduncles, much larger than the male with an ample calyx, sterile stamens 4 inserted on the corol, styles 3-4, ovary 6-8 celled, fruit spherical 8 lines in diameter, seed oblong 6 lines long 4 lines broad, albumen ruminate. *Roxb. Fl. Ind.* ii. 537;—*DC. Prod* viii. 231;—*Thw. En. Pl. Zey. p.* 178.

A common tree in our western forests up to nearly 4000 feet, found also on our Eastern ghats and in Ceylon; called Tellagoda and Nalla kaka mushti in Teligu, and in Canarese (S. Canara) Kaka suroli; it flowers in March and April; the wood is white, strong and serviceable.

7. DIOSPYROS CORDIFOLIA, *Roxb.*—A small tree (the trunk and older branches bearing prickles), the young branches and foliage pubescent. Leaves petiolate, ovate oval-oblong or ovate-lanceolate, obtuse or acuminate, cordate round or narrowed at the base, at first thin and soft, at length more coriaceous, with the veins impressed on the upper side, 1 to 2 inches long. Male flowers usually 3 together on short recurved pedicels, the females solitary. Calyx-lobes 4, ovate obtuse ciliate about 1 line long. Corolla urceolate nearly 3 lines long, glabrous; lobes 4, shorter than the tube. Stamens in the males about 16, inserted in pairs at the bottom of the corolla, the filaments very short, the outer anthers longer than the inner ones. Fruit globular, glabrous, about ½ inch diameter to rather more, resting on the calyx, which is flat, with enlarged recurved lobes. *Roxb. Pl. Cor.* i. 38. *tab.* 50;—*A. DC. Prod.* viii. 230. D. rugosula, *R. Br. Prod.* 526. D. rugulosa, *A. DC. Prod.* viii. 229. D. punctata, *Dene. Herb. Tim.* 79;—*A. DC. Prod.* viii. 230. D. goindu, *Dalz. Bombay Flora p.* 141 ?

This small tree is common in the plains and about the foot of mountains in dry localities throughout the Presidency and in Ceylon; in our eastern forests it is called Kàkà ulimera and Vackana (Teligu); the wood is dark brown, mottled, hard and close grained, small but useful for cabinet work. The tree also inhabits North Australia. D. capitellata, *Wight's Icones* 1224 and 1588, well represents the species. I consider Roxburgh's cordifolia, D. cordifolia, *Wight's Ill. tab.* 148, has the flower much too large for this plant, and is I believe the tree I consider Roxburgh's montana.

8. DIOSPYROS CHLOROXYLON, *Roxb.*—A small tree, occasionally armed, young branches tomentose, leaves oblong rounded at both ends tomentose on both sides, 2-2½ inch long by ¾-1¼ broad, petioles 3-4 lines long. *Male*, fascicles generally 3 flowered, peduncles 2-3 times as long as the petioles, flower about 4 lines long, calyx and corol 4-lobed, stamens about 16, rudiment of ovary very hairy; female flowers solitary sessile with about 8 single stamens, styles 4 bifid, ovary 8-celled. *Roxb. Fl. Ind.* ii. 538.

This small tree I have only observed on the Nullay Mullay hills (Kurnool) 1-3000 feet elevation, and in the Northern Circars; it is allied to D. cordifolia, but differs in its longer more perfectly oblong leaves, and in its male fascicles being on much longer peduncles, and with fewer flowers. I have only specimens of the male tree.

9. DIOSPYROS MONTANA, *Roxb.*—A middling sized tree, occasionally armed, bark smooth, young branches softly downy, leaves ovate to ovato-oblong acute at the apex rounded or subcordate at the base, very softly downy on both sides or in age glabrous above, membranaceous, 2-3 inches long by 1-1¼ broad, petioles 2-3 lines long; male flowers in short reflexed racemes twice as long as petiole 5-6 flowered, stamens 16 on 8 filaments; female flowers solitary, calycine lobes acute or rounded enlarging to 4-5 lines long and reflexed in fruit very softly downy, staminodia 4 or wanting, ovary 8-celled, styles 4, stigmas large verrucose, fruit globose 6-8 lines in diameter. *Roxb. Fl. Ind.* ii. 538;—*Wight Icones tab.* 1225. D. Orixensis, *Willd. in DC.* ?

A very common tree in the plains and about the foot of the mountains throughout the Presidency. Wight's Pl. 1225. exactly represents the female of what I consider Roxburgh's montana, and I believe his Pl. 148 in Illustrations to be this tree. This and the last two species have evidently been involved in much doubt, and from Roxburgh's short descriptions it is difficult to be certain of his species. This tree has the leaves very softly downy, whereas they are rather rough in both the other species, this is called Muchi tunki and Yerri goda in the Circars (Teligu). Its wood is hard and serviceable.

10. DIOSPYROS OVALIFOLIA, *Wight.*—A large tree glabrous, leaves oval to elliptic glabrous slightly coriaceous, 1½-6 inches long by 1½-2 inches broad, petiole 2-3 lines long, male flowers aggregated on short peduncles on the naked boughs, 3-8 flowered, calyx

hairy 4-5-lobed, corol twice the length of the calyx 4-5 cleft, stamens double 16-20, rudiment of ovary very small hairy, female flowers sessile or subsessile solitary or 3-6 aggregated, flowers 4-5 merous, sterile stamens entirely wanting or 1-7, ovary 4-6 celled, stigma 2-3 lobed, lobes dilated, fruit spherical glabrous glaucous 8 lines in diameter generally 1-seeded, seed subspherical, albumen not ruminate. *Wight Icones tab.* 1227.

A common tree in our western forests from 1000 to 4000 feet elevation, abundant on the Anamallays, Wynad, Coorg, &c., and I have also found it on the Nallay Mallays, Kurnool district, and it is common in Ceylon. I know nothing of its timber or uses.

11. Diospyros Candolleana, *Wight.*—A large tree glabrous, leaves elliptic oblong obtusely acuminate very coriaceous glabrous and rather shining, 4-6 inches long by 1-2 inch broad, flowers axillary aggregated sessile, calyx and corol 4-5 cleft, densely clothed with rusty pubescence. Male flowers very numerous, stamens 10 in pairs, the filaments united at the base, the anthers with a sharp short point at the apex ; female, calyx segments revolute at the margins. Staminodia 4-5 single, ovary 4-celled, style simple, stigma 2-lobed. *Wight Icones tab.* 1221-22.

This tree is not uncommon on the northern slopes of the Nilgiris and in the Wynad. I know nothing of its uses.

12. Diospyros Nilagirica, *Bedd.*—A middling sized tree, branchlets, young leaves, and inflorescence densely rufo-tomentose, leaves elliptic attenuated at both ends glabrescent and shining above, 5-6 inches long by about 2 inches broad ; male flowers, in axillary subsessile several flowered capitula bracteated, calyx 4-cleft to about the middle, corol 4-cleft with the lobes rounded, stamens 16 unequal in length in 8 pairs inserted on to the base of the tube of the corol, filaments hairy, a small hairy ovoid rudiment of an ovary ; female flowers sessile or 2 in the axils of the leaves, calyx enlarging in fruit dilated between the lobes with the margin reflexed, sterile stamens 8 alternately longer on single filaments inserted on to the base of the corol tube, styles 4 much reflexed, stigmas dilated, ovary 8-celled, fruit globose depressed size of a small greengage. *Bedd. Icones part* vii. *tab.* cxxxvi.

Sisparah ghat, Nilgiris 3000-4000 feet elevation.

13. Diospyros Thwaitesii, *Bedd.*—A middling sized tree, branchlets, young leaves and inflorescence rufo-tomentose, leaves elliptic with a long gradual acumination slightly attenuated at the base, 4-5 inches long 1-1½ broad reddish brown when dry, petioles about ½ an inch long. Male flowers 1-3 sessile in the axils, bracteated, stamens 10-12 in pairs of nearly equal length inserted on to the base of the corol tube ; female flowers as in the male, calyx enlarging in fruit, sterile stamens 5 on the corol tube, each anther tipped with 2 very long setæ, styles 3-2-cleft, ovary 4-celled, fruit subspherical, densely rufo-pilose at length glabrous 7-8 lines in diameter, seed oblong black transversely striated 5 lines long 2½ lines broad, albumen ruminate.—Diospyros Candolleana, *Thw. En. Pl. Zey. p.* 181—(not *Wight.*)

Ceylon, at no great elevation ; allied to, but quite distinct from D. Candolleana of Wight. *Bedd. Icones part* vii. *tab.* cxxxv.

14. Diospyros toposia, *Ham.*—A middling sized tree, glabrous, leaves coriaceous, elliptic lanceolate attenuated at both ends, 4-5 inches long by 1½-2 broad, very closely and prominently reticulated, (when dry) petioles nearly ½ an inch long, male inflorescence in 3 flowered cymes on peduncles ¾ inch long on the lower leafless portions of the branchlets or in the axils of the lower leaves, calyx rough but not hairy quite entire when young, at length spliting irregularly at the apex, lobes acute unequal, corol hairy on the outside, 4 lobed at the apex, stamens 20-30 in pairs of unequal length inserted on to the torus, female flowers solitary, stamens 12-16, stigmas 4, ovary 4-6 celled, fruit spherical size of a very large strawberry glabrous but rough.

Tinnevelly hills in damp forests 3-4000 feet (called Toveray) Ceylon, (called Kahakaala) Silhet mountains. *Bedd. Icones part* vii. *tab.* cxxii.

15. Diospyros nigricans, *Dalz.*—Arboreous, glabrous turning very black in drying, leaves membranaceous glabrous oblong with a rather sudden acumination and slightly attenuated at the base, 4-5 inches long by 1½-2 broad, petioles ¼-½ inch long, male flowers in small 3 flowered cymes crowded on small axillary ramuli, calyx 4-parted to the middle, lobes rounded or subacute pilose and ciliate, corol 4-cleft glabrous, lobes rounded or emarginate, stamens about 26 of unequal length, filaments all single and inserted in 2 rows on to the base of the corol round a small 10 lobed rudiment of an ovary, female flowers solitary, calyx enlarging in fruit with the lobes much reflexed, fruit glabrous globose depressed 8 celled. *Dalz. Hook. Jour. of Bot.* iv. *p.* 110.

Bombay ghats. *Bedd. Icones part* vii. *tab.* cxxiv.

16. Diospyros paniculata, *Dalz.*—A middling sized tree, branches glabrous, leaves glabrous lanceolate oblong obtusely acuminate very coriaceous, veins closely reticulated (as in Toposia) 5-9 inches long by 1½-2¾ broad, petioles ¼-½ inch long, male flowers in axillary several flowered velvetty cymes, about ⅓ the length of the leaves, furnished with large ovate obtuse deciduous bracts, calyx ventricose 5-parted, segments foliaceous with the margins reflexed reticulately veined, broadly oval obtuse and apiculated, corol velvetty outside, twice the length of the calyx, gibbous at the base and contracted at the mouth, the 5 segments oblong obtuse as long as the tube, stamens about 20 in pairs subequal in length inserted on the base of the tube and nearly equalling it in length ; female flowers solitary from the branches between the leaves, peduncles 2-3 times as long as the petioles furnished with 2 large ovate bracts about the middle, calyx glabrescent, as in the male but increasing with the fruit, fruit ovoid densely tomentose, 3-4 celled. *Dalz. Hook. Jour. of Botany* iv. *p.* 109 ;—*Bedd. Icones, part* vii. *tab.* cxxv.

Carcoor ghat, Wynad (2-3000 feet elevation), Anamallays, ghat up to the Nelliampaddy Coffee estates from Palghat (2000 feet), Bombay ghats.

17. Diospyros pruriens, *Dalz.*—A small or middling sized tree, young branches densely hirsute with long yellow hairs, leaves narrow-oblong with a blunt acumination more or less cordate at the base, glabrous on the upper side except the costa, very hirsute beneath, 3-5½ inches long by 1-2½ broad, petioles 1-2 lines long ; *male*, peduncles 2-3 times as long as the petioles axillary or between the axils, numerous and often congested on small young ramuli, 1-flowered or very rarely with 2 flowers, calyx 4-parted, divisions linear oblong obtuse reticulated glabrous within, very hairy on the outside, equalling the tube of the corol, corol hirsute on

the outside, limb 4 parted with the divisions as long as the tube, stamens about 14 connate at the base unequal in length and seated on the torus surrounding a very small hairy rudiment of an ovary ; female inflorescence as in the male, but corol more gibbous at the base, sterile stamens 4, very small on the corol tube, styles 2, stigmas dilated and more or less lobed, ovary very hairy 4-celled, fruit ovate conical 1½ inch long densely covered with stinging hairs. *Dalz. Hook. Jour. of Bot.* iv. *p.* 110.

Very common throughout the Wynad up to 3000 feet elevation, Anamallays, South Canara ghats and plains, Tinnevelly and Bombay ghats, also found in Ceylon. *Bedd. Icones part* vii. *tab.* cxxix.

18. Diospyros microphylla, *Bedd.*—A lofty tree, trunk very straight, young branches verticellate, hirsute with long yellowish hairs, old branches glabrous, leaves alternate, elliptic obtusely acuminated slightly attenuated at the base glabrous above sparingly hirsute with long hairs beneath when young, at length glabrous, ¾ to 1½ inches long by ⅜ to ⅝ of an inch broad, petioles 1-2 lines long ; male capitula axillary subsessile 3 flowered bracteated, flowers very small about 1 line long, calyx 4 parted to the middle, divisions ovate acute hirsute on the outside, corol 4-cleft divisions rounded apiculate, hirsute on the outside in a line down the centre, anthers sixteen in pairs 1 longer than the other inserted on to the base of the corol tube, rudiment of the ovary small hairy inconspicuously 8-lobed ; female flowers solitary in the axils, as in the male, no rudiment of stamens, ovary 4-celled, stigmas 2, fruit about as large as a pea.

Anamallays, dense forests up to 3000 feet elevation ; very common in South Canara forests of the ghats and plains (Sooleya) Wynad. *Bedd. Icones part* vii. *tab.* cxxxiii.

19. Diospyros Canarica, *Bedd.*—A good sized tree, glabrous, leaves oblong to obovato-oblong with a blunt acumination, glabrous paler beneath, 5-9 inches long by 1½ to 3 broad, petiole ½-¾ inch long, male capitula axillary many flowered sub-sessile, flowers very small, calyx 5 cleft ⅓ or ½ down, sericeous, corol about double as long as the calyx very silky on the outside, stamens 10 unequal in length in pairs inserted on to the base of the corol tube, a small ovoid hairy rudiment of an ovary ; female flowers in axillary capitula, as in the male but rather larger, calyx 5 parted to below the middle, dilated between the lobes and margins reflexed, sterile stamens 8-10 unequal in length in pairs inserted on to the base of the corol tube, ovary 4-celled, styles 2, fruit not seen.

South Canara plains near the foot of the ghats ; called Karamara, allied to D. Arnottiana, *Miq.* ;—*Bedd. Icones part* vii. *tab.* cxxxiv.

20. Diospyros insignis, *Thw.*—A very large tree, young branches slightly pilose, leaves subopposite or alternate submembranaceous glabrous oblong acuminate, attenuated or rounded at the base, 4-14 inches long by 1½ to 6 inches broad, petioles 3-5 lines long ; male capitula many flowered, flowers very small, calyx pilose 1½ lines long 4 parted to the middle, lobes acute, corol 4 lines long pilose on the outside, stamens unequal in length 14-20, single, in pairs or occasionally 3 on the same filament, partly on the base of the corol-tube and partly on the torus round a small abortive ovary ; *female*, flowers 1-3 axillary sessile, ovary 8-celled, fruit subspherical seated on the thick woody enlarged calyx which has reflexed margins. Seed 11 lines long, 6 lines broad, albumen ruminate. *Thw. En. Pl. Zey. p.* 180.

Anamallays in dense forests 2-3000 feet elevation, Ceylon, 2000 feet. *Bedd. Icones part.* vii. *tab.* cxxx. Yields a valuable timber.

21. Diospyros crumenata, *Thw.*—A very large tree, branches glabrous, leaves glabrous oblong abruptly and obtusely acuminate rounded or slightly attenuated at the base, 2-5 inches long 1-2 broad ; petiole 3-4 lines long ; *male*, cymes pilose 2-3 lines long, 3-5 flowered bent downwards, calyx 2 lines long obscurely 4 toothed at the apex, corol hypocrateriform 5 lines long, stamens about 12-13 of equal length, anthers single seated on the torus ; *female*, flowers large solitary on short thick peduncles (2-3 lines long), calyx 4 lines long pilose on both sides 4-lobed to the middle and dilated between the lobes, lobes rounded apiculate, corol a little longer than the calyx, sterile stamens about 8 equal in length, filaments single seated on the base of the corol, ovary 8 celled, stigmas 4, fruit sub-spherical 1½-2 inches in diameter, at length glabrous 6-8 seeded, seeds black shining 1 inch long ½ inch broad, albumen ruminate. *Thw. En. Pl. Zey. p.* 179.

Ceylon mountains, 2000-4000 feet elevation. *Bedd. Icones. part* vii. *tab.* cxxvi. A good building timber.

22. Diospyros affinis, *Thw.*—A middling sized tree, branches subglabrous, buds pilose, leaves glabrous subcoriaceous prominently reticulated, lanceolate-oblong attenuated at both ends 1¼-4½ inches long by 6-16 lines broad, turning black in drying, petiole 3-5 lines long ; *male*, cymes pilose 3-7 flowered a little longer than the petiole, calyx 1½ lines long shortly 4-toothed, corol 4 lines long hypocrateriform, stamens about 12 of equal length, filaments single seated on the torus ; *female*, flowers solitary large on short peduncles, calyx 5 lines long pilose within subglabrous on the outside, 4-cleft to the middle dilated between the lobes with long acuminations, sterile stamens 8 single of equal length seated on the base of the corol, ovary 6-celled, styles 4, fruit spherical apiculate 1 inch long at length glabrous 4-seeded, seed 6-7 lines long 4 lines broad, albumen ruminate. *Thw. En. Pl. Zey, p.* 179, nearly allied to D. crumenata.

Ceylon mountains. *Bedd. Icones part* vii. *tab.* cxxvii. A good building timber.

23. Diospyros quæsita, *Thw.*—A large tree, branches glabrous, leaves glabrous prominently reticulated oblong abruptly acuminate attenuated at the base, 3-7 inches long by 1½-3 broad, turning blackish when dried, petioles 3-7 lines long channelled above as is the costa of the leaf ; *male*, cymes 3-7 flowered pilose about the length of the petiole, calyx shortly 5-toothed, corol hypocrateriform, stamens about 16 of equal length, filaments single seated on the torus ; *female*, flowers solitary, calyx 5-lobed to the middle dilated between the lobes, lobes acute, fruit subspherical 2-2½ inches long. *Thw. En. Pl. Zey. p* 179.

Ceylon, in the dense forests at the south of the island at no great elevation ; this is the tree which yields the valuable Calamander word of commerce. *Bedd. Icones part* vii. *tab.* cxxviii.

24. Diospyros oppositifolia, *Thw.*—A middling sized tree, leaves opposite slightly pilose when young at length quite glabrous, firm in texture ovate or elliptic abruptly shortly acuminate rounded at the base, veinlets parallel obscure, 2-6 inches long by 1½-3 broad, petioles 1-2 lines long; *male*, capitula few flowered, calyx 1 line long 4-lobed to nearly the middle, lobes acute, corol slender about 3 lines long, stamens about 8 unequal; *female*, flowers unknown. *Thw, l. c. p.* 181.

Ceylon, up to an elevation of 1000 feet, called Kalumidereya. The timber much resembles the true calamander wood. *Bedd. Icones part* vii. *tab.* cxxxi.

25. Diospyros Gardneri, *Thw.*—A middling sized tree, branches terete glabrous, buds fusco-pilose, leaves membranaceous glabrous and shining inconspicuously veined, narrow oblong acuminate, a little narrowed at the base, 3-7 inches long by 1½-2 broad, petioles 3-4 lines long. *Male*, flowers 1-4 axillary subsessile, calyx 2 lines long 4-parted to the middle, lobes triangular acute, corol 5 lines long, tube slightly inflated, stamens about 12 all more or less connate at the base, filaments pilose; *female*, flowers solitary erect, calyx 2½ lines long, lobes recurved, margins reflexed, ovary 8 celled, berry depresso-spherical apiculate (immature) 1 inch long fulvo-pilose when young, at length glabrous shining and half hid in the much enlarged calyx. *Thw. En. Pl. Zey. p.* 181.

Ceylon, up to 2000 feet elevation; called Kadoombaireya. Yields a valuable timber for building and cabinet purposes. *Bedd. Icones part* vii. *tab.* cxxxii.

26. Diospyros hirsuta, *L.*—A middling sized tree, young leaves and inflorescence-ferrugineo tomentose, leaves subcoriaceous elliptic or oblong more or less abruptly acuminate slightly narrowed at the base, at length subglabrous, 3-8 inches long 1-3 inches broad, petiole tomentose 3-4 lines long; *male*, capitula many flowered, calyx 1 line long 5-parted nearly to the middle, corol about 2 lines long, rudiment of ovary small, stamens 5 on the torus round the rudimentary ovary; *female*, flowers 1-3, calyx thick 3 lines long 5-parted to beyond the middle, lobes triangular acute margins reflexed, corol a little longer than the calyx, sterile stamens 5 on the corol tube, ovary 10-celled, fruit ovoid apiculate fulvo-tomentose 9 lines long 6-10 seeded seated on the enlarged calyx, seeds black transversely striated 7 lines long 3 lines broad, albumen ruminate. There are occasionally female flowers in the capitula on the male tree, they are small and have the ovary only 6-celled and probably abortive. *Thw. En. Pl. Zey. p.* 181;—*L. f. Supp. p.* 440;—*A. DC. vol.* viii. *p.* 223.

Ceylon, forests of the south of the island. *Bedd. Icones part* vii. *tab.* cxxxvii.

27. Diospyros Moonii, *Thw.*—A middling sized tree, branches terete slightly pilose when young but soon glabrous, leaves coriaceous oblong acuminate rounded at the base glabrous above, costa and petiole channelled, sparingly pilose beneath, 5-12 inches long 1½-4 inches broad, petiole 3 lines long, inflorescence axillary fulvo-pilose; *male*, capitula 6-10 flowered, calyx 2 lines long 5-parted nearly to the middle, corol about 4 lines long, stamens 5. *Female*, flowers 1-2, calyx thick 3 lines long margin revolute, corol about equal to the calyx in length, stigma obscurely 5-lobed, fruit 1½ inches long 6-10 seeded seated on the enlarged calyx, seed oblong compressed transversely rugose blackish, 7 lines long 4 lines broad, albumen ruminate. *Thw. En. Pl. Zey. p.* 182.

Ceylon at no great elevation. *Bedd. Icones part* vii. *tab.* cxxxviii.

28. Diospyros attenuata, *Thw.*—A middling sized tree, leaves membranaceous glabrous or sparingly pilose oblong acuminate attenuated at the base into a short petiole, closely and minutely reticulated pale beneath, 1½-4 inches long ½-1 inch broad, petiole 1-2 lines long, inflorescence strigose with brownish yellow hairs amongst which are mixed some black hairs; *male*, capitula 3-10 flowered, calyx 1 line long 4-5 parted to below the middle, lobes lanceolate acute, corol about 2 lines long, stamens 5 on the base of the corol tube round the rudiment of an ovary; *female*, flowers solitary axillary, calyx 3-4 lines long 4-5 parted to below the middle, lobes lanceolate acute reflexed at the margin, corol a little longer than the calyx, sterile stamens 5 on the corol tube, stigmas 2 short spathuliform, ovary 4-celled, fruit oblong acuminate 1-1½ inches long 2-3 seeded, seeds chesnut shining oblong acuminate, albumen not ruminate. *Thw. En. Pl. Zey. p.* 183.

Ceylon, Pasdoon Corle, at no great elevation. *Bedd. Icones part* vii. *tab.* cxxxix.

29. Diospyros acuta, *Thw.*—A middling sized tree, young branches terete pilose but soon glabrous, leaves coriaceous glabrous or beneath sparingly pilose, oblongo-lanceolate acute rounded at the base inconspicuously venose, channelled on the costa above 5-12 inches long by 1-3 inches broad, petiole channelled ½-1 inch long, inflorescence adpressedly fulvo-pilose sometimes monœcious and then the female capitula are near the apex of the branches, and the male below, calyx 4-5 parted to below the middle, lobes lanceolate acute. *Male*, capitula many flowered, calyx 2 lines long, corol about 4 lines long, stamens as many as the lobes of the corol, rudiment of ovary very small. *Female*, capitula 1-4 flowered, calyx 4-5 lines long the segments more or less reflexed at the margins, corol about as long as the calyx, stigmas 2-3 one line long spathuliform, ovary 4-6 celled, fruit acuminated 1½ inch long seated in the slightly enlarged calyx, seed 2-3 brown shining oblong acuminate 1 inch long, albumen not ruminate. *Thw. En. Pl. Zey. p.* 182.

Ceylon Pasdoon Corle.

30. Diospyros obovata, *Wight.*—A tree glabrous except the pedicels and calyx, leaves broad obovate obtuse tapering towards the base coriaceous, 4-6 inches long by 2-3 broad, petioles 4-6 lines long, flowers axillary sessile aggregated in dense capitula, calyx deeply 4-lobed, lobes unequal imbricate interior pair glanduliferous at the apex, corol 6-lobed about the length of the calyx, lobes obtuse, stamens 18, filaments very short, anthers apiculate a large free style-like rudiment of an ovary in the centre. *Wight. Icones tab.* 1226.

I have never met with this tree, and Wight gives no special locality, though I fancy it is from our western forests; the female is unknown, it must be a very distinct species. Several other species of Diospyros inhabit our western mountains, but my specimens are too imperfect for description or determination. One fine species not described here, a very large tree (on the Anamallays and Tinnevelly ghats) with hard fruit, nearly 3 inches in diameter in fascicles of threes on the old branches, is apparently Diospyros ramiflora, *Roxb.*; the timber of many are quite unknown and attention should be given to them by all forest officers.

MACREIGHTEA. A. DC.

Gen. Char. Flowers diæcious. *Male*, calyx 3-toothed deeply cleft on one side, corol 3, rarely 4-cleft cylindrical, lobes imbricate, stamens 3-16, filaments inserted near the base of the corol very unequal in length, anthers oblong dehiscing laterally, rudiment of ovary small or nearly obsolete. *Female*, ovary 6-celled, cells 1 ovuled, ovules pendulous, style cylindrical or slightly conical, stigma small 3-parted. Trees, young parts and inflorescence pilose, leaves penniveined, flowers subsessile axillary solitary, or shortly spicate.

This is a Ceylon species with has not as yet been detected in the continent.

1. MACREIGHTEA OBLONGIFOLIA, *Thw.*—A small tree, young branches pilose, leaves subcoriaceous oblong acuminate, rounded at the base, fulvo-pilose on the nerves beneath or at length glabrous, 3-7 inches long by 1-2½ inch broad, petiole hispid 1-2 lines long. *Male*, corol-tube about ½ as long again as the calyx, stamens about 12, rudiment of ovary very small pilose. *Female*, flowers shortly pedunculate, calyx hispid, lobes acute, ovary pilose, fruit subspherical fulvo-tementose 1 inch long 3-6 seeded, seed 6 lines long 4 lines broad, radicle cylindric, cotyledons oblong, albumen not ruminate. *Thw. En. Pl. Zey. p.* 183.

Ceylon, near Ratnapoora, and in the Singhe rajah and other forests between that place and Galle.

2. MACREIGHTEA OVALIFOLIA, *Thw.*—A small or middling sized tree, leaves coriaceous ovate with an obtuse acumination, rounded or slightly narrowed at the base, 2-3½ inches long by 1-1¾ inch broad, petiole 2-3 lines long. *Male*, calyx 2½ lines long equalling the tube of corol, stamens 13-16, rudiment of ovary obsolete. *Thw. En. Pl. Zey. p.* 424.

Ceylon, Hinidoon Pattoo at no great elevation.

3. MACREIGHTEA ACUMINATA, *Thw.*—A small or middling sized tree, leaves membranaceous ovate or elliptic, much acuminate, rounded at the base or a little acute, 3-5 inches long 1-1½ inch broad, petiole 1½-2 lines long. *Male*, calyx 2 lines long, corol tube 4 lines long, stamens 4-5, rudiment of ovary small oblong attenuate at the apex pilose. *Female*, fruit spherical tomentose and sparingly furnished with a few long hairs 6-7 lines in diameter. *Thw. En. Pl. Zey. p.* 424.

Ceylon, Hinidoon Pattoo.

Analysis of Genera, Pl. XXI, fig. 1.

1. A flower bud (life size.)
2. The same magnified.
3. A 3-lobed corol of female flowers, no stamens.
4. A 4- lobed corol.
5. Calyx.
6. Ovary, style and 3-lobed stigma.
7. Ovary cut vertically, pendulous ovules.
8. Ovary cut transversely, 6 cells each 1-ovuled.
9. Branch in fruit.

I have no male flowers for analysis, but the corol is the same as in the female, but with 12 stamens inserted on the tube, and there is only a small rudiment of an ovary.

HOLOCHILUS. DALZ.

Gen. Char. Flowers diæcious. *Female*, calyx tubular entire truncate sitting in a few imbricate scales, corol tubular 3-cleft to nearly the middle, 3 times as long as the calyx, lobes ovate obtuse spreading. Staminodia 6 inserted on the base of the corol-tube, filaments free twice as long as the anthers, ovary hemispherical glabrous 6-celled, styles 3 erect thickish, stigmas obtuse, ovules solitary in the cells pendulous. *Male*, flower unknown. A tree, leaves elliptic or oblong entire coriaceous glabrous, female flowers solitary minute white. *Dalz. in Hook. Jour. Bot.* iv. *p.* 290.

HOLOCHILUS MICRANTHUS, *Dalz.*—A middling sized tree, leaves elliptic or oblong attenuated at the base, obtusely acuminate coriaceous glabrous 4-5 inches long by 2 inches broad, petiole ½ inch long. *Female*, flowers 3 lines long axillary solitary sessile, fruit cylindric-oblong sitting in the enlarged calyx, hard dry 1 inch long. *Dalz. l. c.*

The female only of this tree was discovered by Mr. Dalzell on the Bombay ghats; the male is unknown, it is probably a Macreightea; it flowers in February and March.

MABA. FORST.

Gen. Char. Flowers diæcious, calyx cup-shaped more or less 3-cleft, corol urceolate or campanulate 3-cleft, lobes convolute to the left. *Male*, stamens 3-6, sometimes 9 (the alternate ones connected at the base) or 12 connate in pairs at the base, accrete at the base with the hairy rudiment of an ovary, filaments filiform, anthers linear often apiculate dehiscing laterally; *female*, staminodia none, ovary hirsute 3-celled, cells 2-ovuled, stigma 3-parted, fruit ellipsoid or rarely globose smooth 2-3 celled, seed generally solitary in the cells (from abortion) pendent oblong transversely furrowed near the base blackish. Trees or shrubs, leaves small entire, flowers solitary or few in the axils small subsessile.

MABA BUXIFOLIA, *Roxb.*—A small tree or shrub, trunk irregular, branches numerous, young parts more or less pubescent, leaves from oval ovate obovate or orbicular to linear lanceolate from coriaceous in the smaller leaved varieties to quite membranaceous in the larger leaved forms, glabrous and shining above, glabrous or more rarely pilose beneath, from 3 lines to 5 inches in length; *male* flowers several together generally 3 in the axils of the leaves smaller than the females; *female*, flowers solitary in the axils, fruit 3-5 lines in diameter round smooth yellow when ripe. *DC. Prod.* viii. 240;—*Wight Icones* 736. Maba ebenus, *Spr. DC. l. c.* 242. M. Neilgherrensis, *Wight Icones.* 1228-29. M. angustifolia, *Miq.* M. nigrescens, *Dalz. Bomb. Flora p.* 142. Ferriola buxifolia, *Roxb. Fl. Ind.* iii. 790.

This is very common throughout the Presidency and in Ceylon, Bombay, &c, it is found from the plains up to about 6000 feet elevation, on the mountains it is a small tree but in the plains often only a shrub. It is called Alli in Teligu on the eastern side of the Presidency; and Irramballi in Tamil and Kalu-habaraleya in Ceylon; the wood is small, very hard, dark colored, heavy and durable, it is adapted for the lathe. The tree is most variable as to its leaves; the commonest variety has very small, hard, box-like leaves, but some of the mountain forms have them very much larger and quite membranaceous.

Analysis, Pl. XIX, fig. 4.

MABA BUXIFOLIA.

Male and female flowers, showing 6 stamens in the former, none in the latter, the 3 celled ovary, the cells each with 2 ovules.

Analysis of Genera, Pl. XVIII, fig. 1.

CANARIUM STRICTUM.

Fertile tree.—1. A spike of fertile flowers (life size), the flowers are never panicled as in the male.
2. A fertile flower.
3. The same calyx opened, showing 4 petals.
4. A petal.
5. A 3-merous fertile flower, calyx and petals removed, stamens 6.
6. Stamen-tube of a 4-merous flower opened out, showing 8 stamens (anthers effete?)
7. Anthers, front and back view.
8. Ovary, style and stigma.
9. Ovary cut vertically.
10. The same cut horizontally.
11. Ripe fruit (life size).
12. The hard nut removed, showing that its apex has 3 minute points.
13. Transverse section of the nut, 3 cells (2 only perfect). All drawn from fresh specimens collected on the Anamallays.

Fig. 2. CAREYA ARBOREA.

1. A spike of flower buds, showing the bracts, and that the flowers are sessile.
2. A flower bud.
3. An advanced flower-bud cut vertically.
4. Calyx and style of a full flower, petals and stamen-tube removed.
5. A petal from a full flower.
6. Portions of the stamen-tube from a full flower, showing some of the filaments sterile.
7. Anthers, front and back view.
8. Vertical section of the ovary of a full flower.
9. Transverse section of the ovary showing that it is 1-celled with 4 large 2 lobed many ovuled parietal placentas, which do not meet in the centre except at the very base of the ovary (well described by Roxburgh under C. sphœrica, which is the same species.)
10. One of the parietal placentas.
11. Fruit (life size).
12. The same cut vertically, showing the few seeds immersed in a fibrous fetid pulp.
13. A seed.
14. The same, transverse section.
15. The same, vertical section. (All drawn from fresh specimens collected in the Anamallays.)

Pl. XXI, fig. 2.

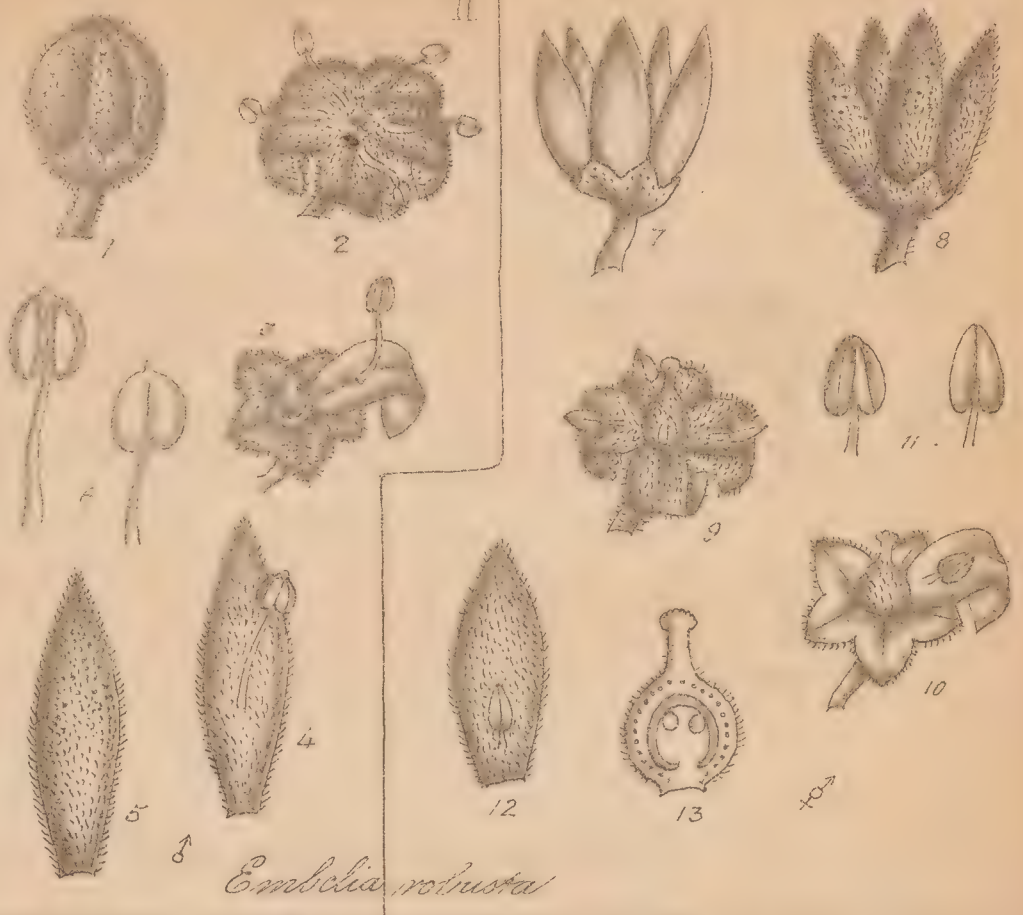
LUMNITZERA RACEMOSA.

1, 2. Bud and flower (life size.)
3, 4. Bud and flower magnified.
5. Flower opened and ovary cut vertically, stamens 10 alternately shorter, ovules 4 pendulous in the 1-celled ovary.
6. A petal.
7. Stamens, front and back view.

I

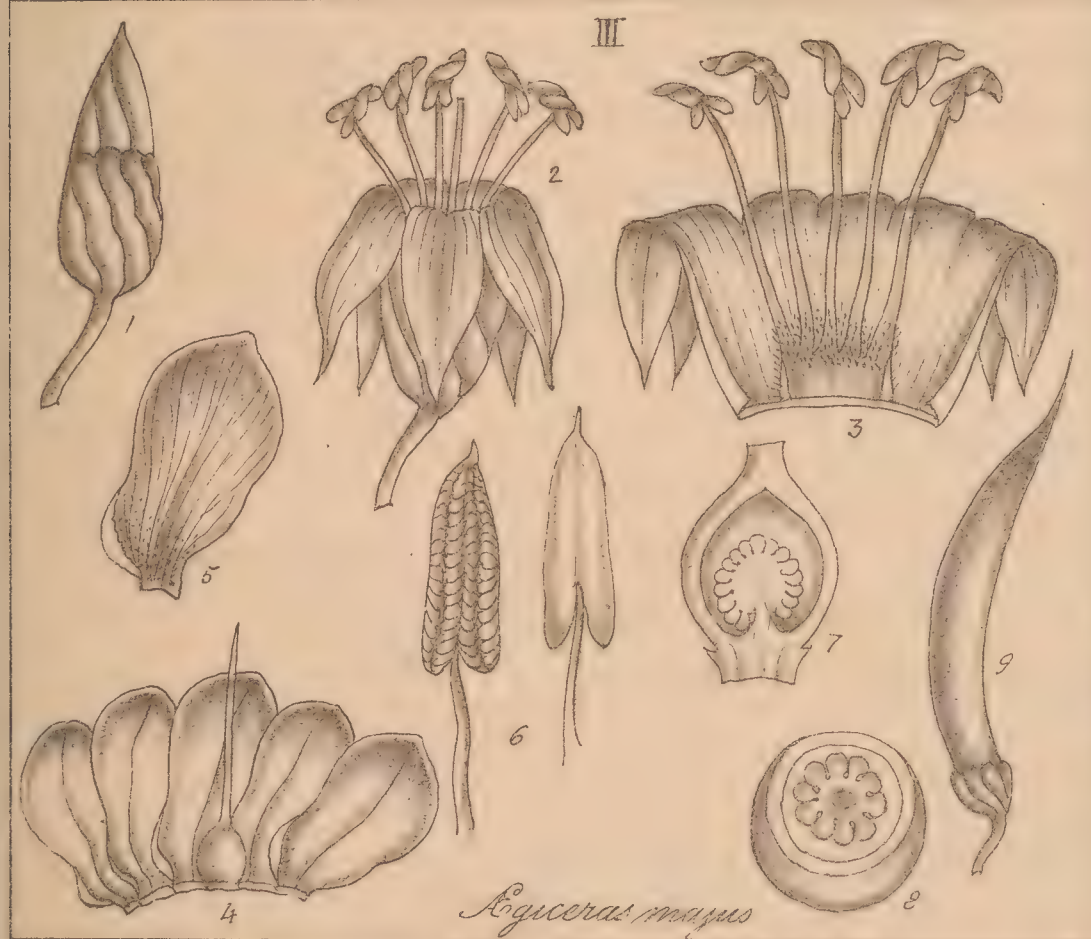
Gualtheria fragrantissima

II



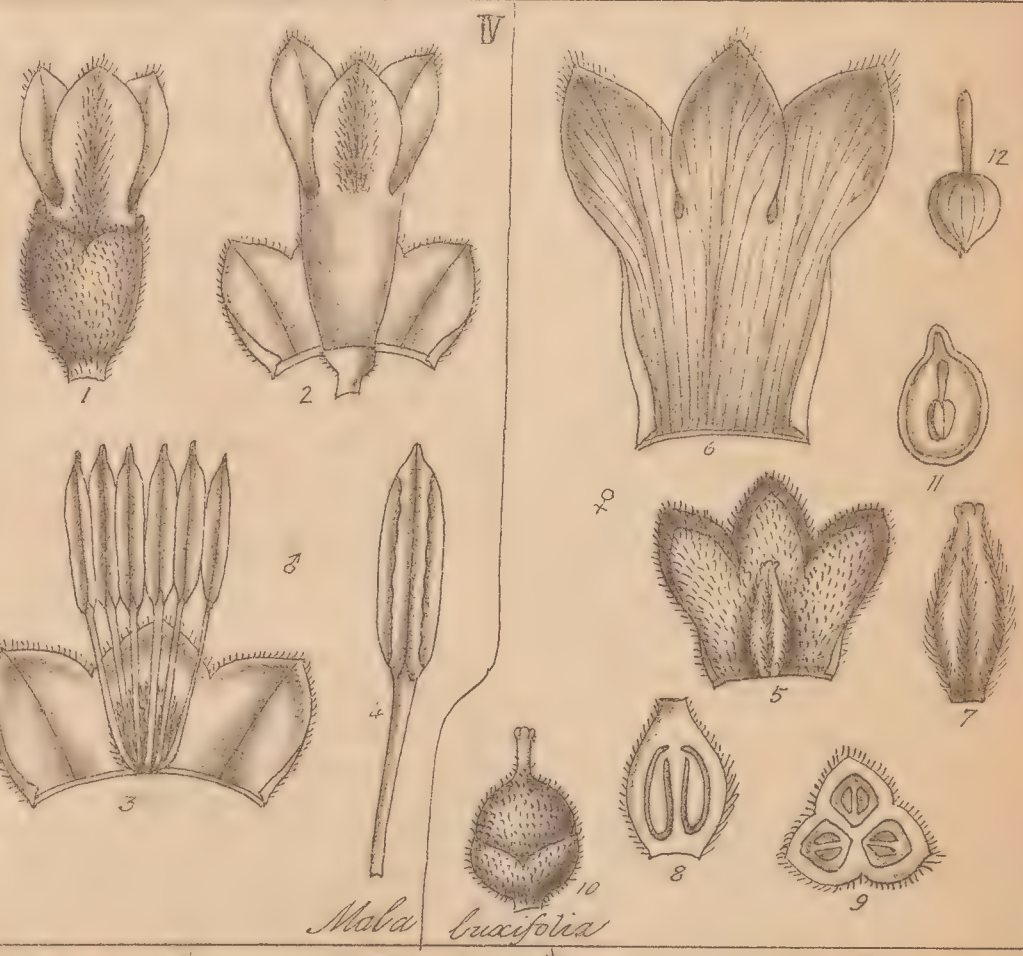
Embelia robusta

III



Aegiceras majus

IV

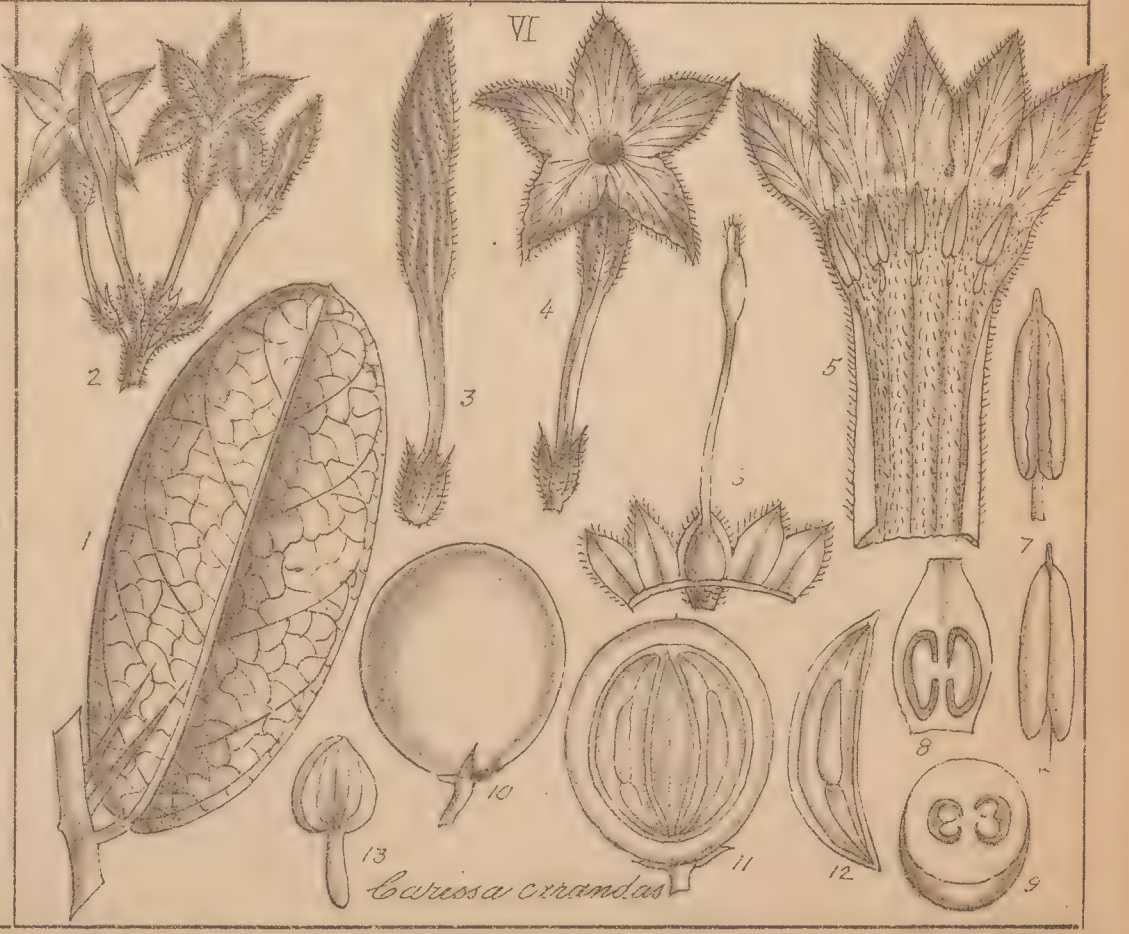


Mala bracteata

V

Ligustrum Perottetii

VI



Carissa carandas

Dumphey Lith.

ORDER LII.—STYRACACEÆ.

Flowers regular, hermaphrodite. Calyx-tube usually more or less adnate to the ovary, the limb 5-or rarely 4-lobed. Corolla regular, deeply divided into as many lobes as the calyx or rarely twice as many, imbricate or valvate in the bud. Stamens usually indefinite, sometimes only twice as many or equal in number to the corolla-lobes, attached in one or more series to the base or within the tube of the corolla, those of the outer series usually alternating with the corolla-lobes. Ovary more or less inferior or rarely quite superior, 2 to 5-celled, with 2 or more ovules in each cell, either all pendulous or the upper ones erect. Style undivided; stigma capitate entire or lobed. Fruit more or less succulent and indehiscent or rarely opening in valves. Seed usually solitary, the embryo in the axis of a fleshy albumen. Trees or shrubs. Leaves alternate, entire or toothed, without stipules. Flowers axillary, solitary or in simple or branched racemes.

This order is only represented in South India by a single genus, Symplocos, which yields a good many trees and shrubs chiefly confined to the mountains; the timber of the different species is scarcely known, but it is very inferior in those which have been examined. Styrax is an Himalayan genus yielding shrubs.

SYMPLOCOS. Linn.

Gen. Char.: Calyx 5-lobed, adherent, corolla 5-lobed or (in some American species) 6 to 10-lobed, the lobes much imbricate in the bud. Stamens indefinite, usually more than 15, rarely only 12 or 10, filaments filiform; anthers small, ovoid or globular. Ovary more or less inferior, 2 to 5-celled, with 2 or rarely 3 ovules in each cell. Style filiform, entire or shortly lobed at the top. Berry from globular to oblong, crowned by the persistent calyx-lobes, usually with 1 or 2 seeds only. Embryo with a long radicle and very short cotyledons. Trees or shrubs, the specimens almost always taking a yellow tinge in drying. Flowers small, in axillary racemes, or clusters, each one solitary in the axil of a small bract, with 2 bracteoles under the calyx.—Ciponima, *Aubl.* Barberina, *Vell.* Hopea, *Linn.* (not *Roxb.*) Stemmatosiphon, *Polh.* Decadia, *Lour.*

** Ovary 3-celled.*

1. Symplocos Gardneriana, *Wight.*—For description, &c. see Pl. ccxxxvii.

2. Symplocos spicata, *Roxb.*—A moderate sized tree, quite glabrous; leaves glabrous shining usually oval-elliptical or oblong-elliptical but varying from obovate to lanceolate obtuse or shortly acuminate, entire or irregularly toothed contracted into a petiole, 4-6 inches long by 1-1½ broad; spikes axillary solitary sometimes simple generally branched into a panicle 2-3½ inch long, flowers numerous sessile small scattered yellow, bracts and bracteoles small and very deciduous, calyx 5-lobed, lobes exceedingly short, broad, petals about 1½ lines long cohering in a ring with the stamens which are about 40 in number and sometimes obscurely 5-adelphous, ovary 3-celled with 3-4 ovules in each attached to the axis, style as long as the filaments, stigma large and perforated, fruit a small drupe the size of a pea, short-urceolate contracted at the apex about 12-ribbed olive colored, nut hard and thick conform to the drupe. *Roxb. Fl. Ind.* ii. 541;—*Wight Ill. tab.* 150.

This small tree is the commonest species of the genus in this Presidency, being found everywhere on the western side of the Presidency, Mysore, Shevaroys, &c., and it also extends to Bengal and Ceylon; it ranges from the plains up to 7000 feet elevation. On the Nilgiris it is called Boothgani by the Burghers; the wood is close in grain, light, very deficient in fibre and not durable, it is only used as firewood.

3. Symplocos obtusa, *Wall.*—A small or middling sized tree, all the parts perfectly glabrous except the margin of the calyx which is ciliated, leaves coriaceous oblong or obovate to suborbicular quite rounded at the apex or very shortly acuminate, attenuated or quite rounded at the base, inconspicuously toothed, 3-7 inches long by 1-3 inches broad, veins prominent beneath, petiole ½ to 1 inch long, bracts very early caducous, racemes axillary about 2 inches long simple, flowers few very shortly pedicelled, calyx obconical, lobes rounded, fruit oblong. *Wall. DC. Prod.* viii. *p.* 255;—*Wight Icones tab.* 1233.

A common tree on the Nilgiris and Anamallays 5-7000 feet elevation, also on the Ceylon mountains; very variable in the size and shape of its leaves.

4. Symplocos nervosa, *DC.*—A tree, branches terete marked with numerous elevated scars of fallen leaves, leaves ovate-lanceolate to elliptic acute or somewhat acuminate, membranaceous to coriaceous, serrato-dentate, glabrous except a few scattered hairs on the costa and rarely on the primary veins beneath, 2-3 inches long by 1¼-1½ broad, petioles 3-4 lines long slightly hairy, racemes axillary several congested on the ends of the branches, about twice as long as the petioles hairy, flowers crowded sessile, calyx tube short glabrous, lobes equal or subequal, ovate obtuse hairy on the back, corol glabrous about as long as the stamens, ovary hairy 3-celled with 2 ovules in each cell, 1 suberect and small, the other long and pendulous, berry oblong 6 lines long crowned with the base of the calyx lobes. *Wight Icones tab.* 1235. S. Hamiltoniana, *Wall. in DC. l. c. p.* 254?

Variety β. hirsuta: S. hirsuta, *Wight and Gardn.;—Thw. En. Pl. Zey. p.* 185. Ceylon.

Nilgiris, very common about Ootacamund, in flower in February. A large tree, timber very perishable and not used except for firewood. Variety *β.* I only have from Ceylon; it has exactly the same foliage, and only differs in the inflorescence being much more hirsute and by the ramuli being occasionally somewhat hispid. S. foliosa, *Wight Icones tab.* 1234, is the same plant, at least I have failed to find any difference: the vertical sections of the ovary in both plates, 1834 and 1835, are wrong; in the former 3 pendulous ovules are represented, and in the latter a solitary pendulous ovule. I have always found 2 ovules, 1 small and suberect, near the apex of the cell; the other long and pendulous and attached at nearly the same point.

5. Symplocos pulchra, *Wight.*—A shrub, ramuli, leaves, racemes, pedicels and bracts clothed with long brownish hairs, leaves oval to ovate or narrow ovato-oblong generally with a longish very finely pointed acumination rarely rounded at the apex, often somewhat cordate at the base, sharply serrated with the teeth and margin setose, up to 7 inches long and 2¼ broad, petioles

2-3 lines long, racemes filiform 1-2½ inches long, 2-4 flowered, flowers large pure white 10-11 lines in diameter, calyx lobes ciliate, corol glabrous, stamens very numerous, ovary pubescent 3-celled. *Wight Icones tab.* 1230.

This very lovely shrub is very common on the Sisparah ghat, Nilgiris, 3-4000 feet elevation, but I have never met with it elsewhere. Wight's figure is very good except that he leaves out the very long dense hair that covers the branches copiously and the leaves more sparingly.

6. Symplocos microphylla, *Wight.*—A much branched glabrous shrub 6 feet high, leaves elliptic obtuse serrated coriaceous glabrous or with a few hairs on the costa beneath, 1-1½ inches long by 8-10 lines broad, petioles 3 lines long, racemes axillary 6-9 lines long pilose 3-6 flowered, bracts ovate obtuse pubescent, calyx-segments suborbicular pubescent and ciliate, corol about as long as the very numerous stamens, ovary 3-celled, cells 2-ovuled. *Wight Icones tab.* 1232.

Nilgiris, Avalanche, 6-7000 feet elevation.

7. Symplocos monantha, *Wight.*—A much branched glabrous shrub, leaves elliptic with a tapering acumen serrated, 1½-2 inches long by about 8 lines broad, petioles 3 lines long, flowers axillary solitary sessile, 3-4 lines in diameter, calyx glabrous, segments ovate pointed much shorter than the corol hairy along the centre of the back and ciliate at the margins, corol-lobes roundish obovate as long as the numerous stamens, ovary 3-celled, with 3 ovules in each cell. *Wight Icones tab.* 1236.

Tinnevelly mountains.

8. Symplocos Anamallayana, *Bedd.*—A small tree, everywhere glabrous, leaves ovate to sub-orbicular with a short obtuse point, very coriaceous shining, serrulate in the upper half, 1½ to 1¾ inches long by about 1 inch broad, petioles about 1 line long, peduncles simple axillary solitary or 2-3 together, about 1 inch long furnished with 2 bracts at the base of the calyx, flowers small white, calyx lobes acute about 1-3rd the length of the corol, corol lobes rounded, ovary 3-celled, with 2 pendulous ovules in each cell, fruit narrow oblong ½ to ¾ inch long.—Symplocos uniflora, *Bedd. in Linn. Trans. vol.* xxv. *(*not *Benth.)*

Anamallays, 5-6000 feet elevation. *Bedd. Icones tab.* cxvi.

9. Symplocos acuminata, *Bedd.*—A small tree or large shrub, young shoots, peduncles, and bracts minutely hairy otherwise quite glabrous, leaves elliptic lanceolate attenuated at the base and furnished with a very long acuminated point, subentire or with a few very inconspicuous distant teeth in the upper half, about 4 inches long by 1½-1¾ broad, racemes slender axillary or supra-axillary slightly hairy as are the bracts, 1-2 inches long, bearing several pedicelled white flowers, calyx-lobes rounded or subacute, ½ shorter than the corol, flowers ½ an inch in diameter, corol-lobes obtuse, ovary 3-celled with 2 pendulous ovules in each cell.

Wynad, very common on the top of the Brumagherries, elevation 5000 feet, also on the Tirrihoot peak at a less elevation. *Bedd. Icones tab.* cxvii.

10. Symplocos rosea, *Bedd.*—A large shrub, with small rose-colored flowers, young branches, petioles, and inflorescence hairy, leaves elliptic oblong to lanceolate, slightly attenuated at the base and furnished with a longish sharp acumination, very finely but sharply serrated except at the base, glabrous above, glabrescent beneath or furnished with a few hairs on the costa and veins, 5-6 inches long by 1½-2½ broad, petioles about 4 lines long, racemes axillary 1-3 inches long very hairy as are the deciduous bracts and the calyx, calyx-lobes acute about ½ as long as the corol, corol-lobes obtuse glabrous, ovary 3-celled, cells 2 ovuled, ovules pendulous, fruit oblong about ½ an inch long, puberulous. *Bedd. in Linn. Trans. vol.* xxv.

Anamallays, moist woods, 2000 to 4000 feet elevation. *Bedd. Icones. tab.* cxv.

11. Symplocos oligandra, *Bedd.*—A small or middling sized tree, much branched, gemmæ and young parts minutely puberulous, leaves coriaceous elliptic shortly pointed or rarely obtuse, glabrous on both sides shining above pale beneath, quite entire or with a very inconspicuous tendency to crenation near the apex, about 2 inches long by 8 lines broad, petioles 2-3 lines long channelled on the upper side and puberulous; racemes puberulous very short scarcely longer than the petioles 3-6 flowered, calyx puberulous scarcely a line long, segments unequal, corol glabrous about twice as long, stamens as long as corol 12 (rarely only 10-11) generally hexadelphous in pairs, or irregularly pentadelphous in bundles of 2-3 or 4, the others solitary, ovary 3-celled, ovules 2, the upper one very small suberect the lower long and pendulous, fruit not seen.

Tinnevelly and Travancore ghats, 3000-5000 feet elevation; the species differs so from all the others in its stamens that I have been induced to give dissections of the flowers.

Analysis of Genera, Pl. XX, fig. 1.

1. A flower bud.
2. A full flower, corol 5-parted to nearly the base, lobes imbricate.
3. A corol opened, showing only 12 stamens regularly 6-adelphous, in pairs adnate to the inside of the very short tube of the corol.
4. A corol opened, showing 12 stamens irregularly pentadelphous.
5. A pair of the stamens removed.
6. Anthers, front and back view, filament attached to centre of back.
7. Calyx, style, and 3-lobed stigma.
8. Ovary cut vertically, 2 ovules in each cell, 1 very small, the other long and pendulous.
9. Ovary cut transversely, showing the 3 cells.

12. Symplocos rufescens, *Thw.*—A glabrous tree, branches angled, leaves oblong-lanceolate, shortly and obtusely acuminate acute at the base inconspicuously venose, obscurely crenulate and denticulate above the middle, 1½-4 inches long by ¾-1½ broad, reddish when dry, petiole 2-3 lines long, racemes simple much shorter than the leaves, bracts small roundish glabrous

but ciliate at the margin early deciduous, bracteoles oblong a half shorter than the calyx subpersistent glabrous but ciliate, the lower flowers pedicellate, calyx-lobes rounded a little acute glabrous except the ciliate margin. *Thw. En. Pl. Zey. p.* 184.

Ceylon, Ambagamwa district, closely allied to S. spicata, and perhaps only a variety of it.

13. Symplocos læta, *Thw.*—A glabrous tree, branches terete striated, leaves ovato-lanceolate acuminate obscurely denticulate acute at the base, sparingly but prominently venose beneath, 1½-4 inches long by 6-16 lines broad, petioles 3-8 lines long; racemes about equal in length to the leaves or a little shorter, naked towards the base, flowers sessile or the lower ones very shortly pedicellate, bracts glabrous small oblong, bracteoles wanting, calyx glabrous except the ciliate margin, tube obconical, segments rounded subacute, fruit oblong. *Thw. En. Pl. Zey. p.* 184.

Ceylon, not uncommon in the more elevated forests of the Central Provinces.

14. Symplocos bractealis, *Thw.*—A glabrous tree, branches terete striated, leaves ovate or ovato-lanceolate acute glanduloso-serrate, closely venose, obtuse or subacute at the base, 1½-4 inch long by 1-2 inch broad, petiole 1-2½ lines long, racemes shorter than the leaves, flowers subsessile, bracts rounded 2-3½ lines long glabrous with a ciliate margin deciduous, bracteoles oblong large glabrous except the ciliate margin deciduous, calyx glabrous, lobes rounded, fruit oblong. *Thw. En. Pl. Zey. p.* 185.

Ceylon, forests of the more elevated parts of the Central Provinces.

15. Symplocos elegans, *Thw.*—A tree, branches terete more or less rufo-tomentose, leaves membranaceous closely venose oblong or ovate, acutely acuminate subentire or obscurely serrulate, above glabrous or pilose at the base of the costa, beneath more or less pilose, rounded or subacute at the base, 1-3½ inches long by ½-1½ inch broad, petiole more or less pilose 1½-2 lines long; racemes shorter than the leaves pilose, bracts and branches externally pilose, calyx glabrous except the ciliate margin, berry oblong subampulliform 5 lines long. *Thw. En. Pl. Zey. p.* 185.

Ceylon, central provinces 5000-7000 feet elevation, closely allied to S. nervosa, var. hirsuta, but differing in its much more acuminate leaves and different character of the pubescence.

16. Symplocos hispidula, *Thw.*—A tree, branches subterete a little angled more or less hispid, leaves membranaceous, closely venose, entire or obscurely denticulate, obovate or oblong abruptly and shortly acuminate, rounded sub-cordate or rarely subacute at the base, above a little pilose or glabrous, beneath pilose, 2½-7 inches long by 1½-3½ inches broad, petioles 2-4 lines long pilose, racemes shorter than the leaves hispid, flowers shortly pedicellate, bracts, bracteoles and calyx externally pilose, fruit subcylindric pilose 5-6 lines long. *Thw. En. Pl. Zey. p.* 186.

Ceylon, Ambagamwa and Saffragram districts, 3000-5000 feet elevation.

17. Symplocos jucunda, *Thw.*—A tree, branches terete fulvo-tomentose, leaves membranaceous or subcoriaceous entire or obscurely and distantly denticulate with a long acumination, and rounded at the base, above glabrous or a little pilose, beneath tomentose and closely venose, 2½-6 inches long by 1-2 inch broad, petioles 2-3 lines long tomentose; racemes tomentose shorter than the leaves, bracts, bracteoles and calyx externally tomentose, flowers shortly pedicellate, fruit subcylindric pilose 6-7 lines long. *Thw. En. Pl. Zey. p.* 186.

Ceylon, Delttotte and Saffragram, 3000-4000 feet elevation.

This and the last are allied to S. nervosa, var. hirsuta, but differ in the shape of the leaves and in the character of the pubescence.

18. Symplocos acuta, *Thw.*—A tree, branches terete, the young ones densely adpresso-pilose, leaves chiefly at the apex of the branches subcoriaceous entire, oblongo-lanceolate acute gradually narrowed at the base into the short petiole, above glabrous channelled at the costa and primary veins, beneath adpressedly pilose on the costa and veins and closely venose, 3-6 inches long by ¾-1½ inch broad, petiole pilose 2-3 lines long, racemes short tomentose, flowers subsessile, calyx lobes pilose, berry elongate subcylindric 6-7 lines long pilose. *Thw. En. Pl. Zey. p.* 186.

Ceylon, Pasdoon Corle, at no great elevation.

19. Symplocos cordifolia, *Thw.*—A tree, leaves chiefly at the apex of the boughs glabrous subcoriaceous obovate obtuse or very shortly acuminate narrowed at the base, auriculato-cordate, closely venose glandulose-denticulate, 3-6 inches long by 1¾-3½ inches broad, petioles 1-2 lines long, racemes tomentose shorter than the leaves, bracts and bracteoles large externally tomentose, calyx tube glabrous, segments externally tomentose, berry oblong glabrous crowned with the tomentose lobes of the calyx. *Thw. En. Pl. Zey. p.* 187.

Ceylon, Central Provinces, 6000-7000 feet elevation.

20. Symplocos marginalis, *Thw.*—A tree, branches terete and with the petioles and racemes densely ferrugineo-tomentose, leaves chiefly at the apex of the boughs coriaceous entire oblong abruptly and very shortly acuminate, subacute at the base, above glabrous except the margin and base of the costa, beneath tomentose and closely and prominently venose, 3½-7 inches long by 1¾-3½ broad, petiole 3-5 lines long, calyx tomentose. *Thw. En. Pl. Zey.* 187.

Ceylon, Ambagamwa district.

21. Symplocos apicaulis, *Thw.*—A very small tree, erect sparingly branched, branches strigose or glabrous terete, leaves rather verticellate at the ends of the boughs, membranaceous glabrous on the costa strigose subentire minutely denticulate closely venose, oblongo-lanceolate acute, 5-15 inches long by 1½-5½ inches broad, petioles 2-3 lines long glabrous or strigose,

racemes much shorter than the leaves, axillary or at the old axils hirsute, flowers subsessile, bracts, bracteoles and calyx externally pilose, berry oblong pilose 6-7 lines long. *Thw. En. Pl. Zey. p.* 187.

Variety strigosa.—Branches strigose, leaves acute or subacute at the base, costa and petiole strigose.

Ceylon, Reigam Corle.

Variety B. glabrifolia.—Branches glabrous, leaves larger glabrous gradually narrowed downwards from above the middle abruptly obtuse at the base.

Ceylon, in the Singhe rajah forest between Galle and Ratnapura, in wet places at no great elevation.

22. SYMPLOCOS CORONATA, *Thw.*—A tree, branches terete ferrugineo-tomentose, leaves coriaceous oblong acute at both ends serrulate, closely venose, above glabrous, beneath tomentose, 5-9 inches long by 2-4 broad, petiole 2-4 lines long tomentose, racemes in the old axils tomentose much shorter than the leaves, flowers crowded sessile, bracts, bracteoles and calyx externally pilose, berry ovoid pilose 4-5 lines long. *Thw. En. Pl. Zey. p.* 187.

Ceylon, Central Provinces, 2-4000 feet elevation.

* * *Ovary 2-celled.*

23. SYMPLOCOS PENDULA, *Wight.*—A small tree, gemmæ and young parts minutely puberulous or glabrous, leaves coriaceous glabrous venose, shining above paler beneath, subentire or with an inconspicuous distant crenation, oblong or elliptic to obovate or obovato-oblong, rounded emarginate or subacute at the apex, 2-3½ inches long by ¾-1½ broad, petioles glabrous or with a few inconspicuous hairs 2-3 lines long, peduncles axillary or from the old axils solitary or twin minutely pubescent, 2-3 lines long 1-flowered (always?) furnished with several ovate blunt ciliate bracts, flowers drooping 6-8 lines long, calyx with its segments very blunt and ciliate, stamens numerous in about 3 series, filaments very flat contracted at the apex just below the anther, stigma large peltate, ovary 2-celled, ovules 2 superposed, fruit narrow oblong 7-8 lines long. *Wight Icones tab.* 1237.

Anamallays and Pulneys 5000-6000 feet elevation, very common; Travancore hills (Attraymallay, 4000 feet); Ceylon mountains. The Travancore specimens have much smaller leaves, narrow-obovate and emarginate, but do not otherwise differ. Wight figures the peduncles as 1-flowered, but describes them as 2-4 flowered; all my specimens have them 1-flowered only. The plant dries to a reddish green (particularly the petioles and young leaves) with only a slight tint of yellow.

I have another tree of this genus; it is very similar to S. spicata, but with much larger and more hairy bracts and bracteoles; it is perhaps only a variety of that species; it is very common in Coorg.

ORDER LIII.—JASMINEÆ.

Flowers regular. Calyx free, usually small, the limb of 4 or 5 or rarely more teeth or lobes or rarely truncate and entire. Corolla with a long or short tube, and 4 or 5 or rarely more lobes, or divided to the base into 4 petals or rarely 2-petaled or wanting. Stamens 2, adhering to the base of the corolla on opposite sides of the ovary, the filaments usually short; anthers 2-celled, the cells opening in longitudinal slits. Ovary 2-celled, with 2 or rarely 1 or 3 ovules in each cell, laterally attached in the young state, but becoming pendulous or ascending accordingly to the growth of the ovary. Fruit succulent or capsular, entire or 2-lobed, 2-celled or reduced to a single cell and seed. Seeds with or without albumen, embryo straight. Trees or shrubs, sometimes climbing, very rarely herbs. Leaves opposite or very rarely alternate, entire or pinnate. Flowers in axillary or terminal panicles, sometimes reduced to short simple racemes or sessile clusters.

Sub Order I, Jasmineæ.—Corol 5 or more lobed, ovules ascending, fruit 2-lobed... ... ... NYCTANTHES.

Sub Order II, Oleineæ.—Corol lobes or petals 4, ovules pendulous, fruit entire.

Corol with a short tube and 4 lobes.
Seed albuminous.
Fruit a drupe, panicles axillary ... ... OLEA.
Fruit a berry, panicles terminal ... ... LIGUSTRUM.
Corol with its 4 petals distinct or connected in pairs by the stamens, fruit a drupe exalbuminous ... CHIONANTHUS.

Not an order of much importance in a forest view; the Suborder Jasmineæ only gives 1 small tree, the Nyctanthes, much cultivated all over India, but it yields numerous climbing species of Jasminum and one of Chondrospermum, a large creeper (Anamallays), not coming within this work. The Sub-order Oleineæ is represented by some 16 trees and shrubs belonging to the genera Olea, Ligustrum, and Chionanthus, and some yield good timber. The genus Schrebera, which I have placed near Bignoniaceæ, yields a fine timber tree and is sometimes referred to this order.

NYCTANTHES. JUSS.

For Gen. Char. see letter-press to Pl. ccxl.

1. NYCTANTHES ARBOR TRISTIS, *Linn.*—For description, &c. see Pl. ccxl.

OLEA. TOURN.

For Gen. Char. see letter-press to Pl. ccxxxviii.

1. OLEA GLANDULIFERA.—For description, &c. see Pl. ccxxxviii.

2. OLEA LONOCIEROIDES, *Wight.*—A small tree, leaves narrow elliptic with a long tapering obtuse point entire glabrous, somewhat coriaceous, 3½-4 inches long by 1-1½ broad, veins not very conspicuous with the looping distant from the margin, petioles

3-4 lines long axillary, peduncles much shorter than the leaves trichotomous each division terminating in a head of sessile flowers or the lateral divisions 1-flowered, calyx 4-parted ciliate, corol deeply 2-parted the 2 lobes again bifid but not so deeply, the 4 lobes long linear subulate, the 2 stamens inserted on the tube below the shorter sinuses, ovary ovate, style short 2-cleft at the apex, ovules pendulous, drupe oblong bony 1-seeded, seed albuminous, albumen horny, embryo foliaceous nearly as long as the albumen. *Wight Icones tab.* 1241.

I have only observed this small tree on the Tinnevelly ghats, 1000-3000 feet elevation.

3. Olea polygama, *Wight.*—A small tree, polygamo-diœcious, leaves lanceolate or oblong to obovate with a sudden acumination entire coriaceous, glabrous, 3-4 inches long by $1\frac{1}{4}$-$1\frac{3}{4}$ broad, petioles 4-6 lines long, venation not very conspicuous slightly channelled or impressed on both sides, panicles cymose shorter than the leaves many flowered in the male, fewer in the hermathrodite, calyx segments ovate acute sub-glabrous, corol glabrous with a long tube and 4 very short lobes the margins of which are inflexed, stamens on very short filaments at the base of the tube, anthers fixed by the middle of the back, ovary ovate, style short but distinct, stigma large capitate, ovules pendulous. *Wight Icones tab.* 1239-40.

Nilgiris, west side. I have only got specimens of the hermaphrodite tree from which the description is chiefly taken.

4. Olea Roxburghiana, *Rœm. and Sch.*—A small or middling sized tree, leaves oblong attenuate at the base entire waved smooth on both sides firm, about 5 inches long and 2 broad, petioles $1\frac{1}{2}$ inch long, smooth flat above, panicles axillary or below the leaves small lax many flowered, bracts small nearly sessile, flowers white, corol-tube short, lobes deep, stigma 2-cleft, ovules pendulous, fruit small oblong purple.—Olea paniculata, *Roxb. Fl. Ind.* i. 105 *(not Br.)* O. Roxburghii, *Spreng. Syst.* i. *p.* 34.

Common on our eastern mountains, but I have never found it on the western side of the presidency; its timber is serviceable.

5. Olea dioica, *Roxb.*—A pretty large tree, diœcious, leaves elliptic tapering at both ends glabrous on both sides, remotely and rather acutely serrate, 4-8 inches long by 2-4 broad, petioles 4-6 lines long; panicles axillary 3-4 inches long, the branches very slender and cymose towards the apex, male flowers glabrous very small, buds quite globose, corol with the tube longer than the very short lobes, no rudiment of an ovary, female flowers not seen. *Roxb. Fl. Ind.* i. *p.* 106.

I have only met with this tree on the South Canara ghats and have only male specimens; the nearly open globose buds are only a $\frac{1}{4}$ of a line in length. It is called Mudla (in the Condapore and Udapi taluqs); it answers tolerably well to the description of Roxburgh's tree; it yields a valuable strong timber.

6. Olea Gardneri, *Thw.*—A small tree 12 feet high, glabrous, leaves aggregated towards the apex of the branches, coriaceous entire ovate or oblong more or less acuminate or rounded, acute at the base sparingly venose, 1-$2\frac{1}{2}$ inches long by $\frac{1}{2}$-$1\frac{1}{2}$ inches broad, petiole 2-3 lines long, cymes pedunculate 3-9 flowered, rarely many-flowered, axillary or below the leaves, pedicels about as long as the leaves, calyx acutely 4-lobed, corol white 1 line long campanulate 4-parted to the middle, lobes rounded, stamens included, fruit round size of a pea, the putamen thin. *Thw. En. Pl. Zey. p.* 188.

Ceylon, Central Provinces 5000-8000 feet.

The Olive *(Olea Europœa)* has been introduced on the Nilgiris.

LIGUSTRUM. Linn.

Gen. Char.: Calyx small 4-toothed, corol with a short tube and 4 lobes valvate or slightly imbricate in the bud, ovules 2 in each cell of the ovary pendulous, style short, fruit a berry, seeds 4 or fewer, albumen copious fleshy or almost cartilaginous. Trees or shrubs, leaves opposite entire, flowers rather small white in terminal trichotomous panicles.

This genus is distinguished from Olea in its endocarp being scarcely or not at all hardened (i. e., the fruit being a berry instead of a drupe) and in its inflorescence being always terminal instead of axillary Several shrubs or small trees of this genus have been introduced into our gardens from Japan and China.

1. Ligustrum robustum, *Roxb.*—A tree generally of small size, young branches glabrous furnished with numerous brown or whitish specks or warts, leaves elliptic acute at both ends entire coriaceous glabrous, 3-4 inches long by 1-$1\frac{1}{2}$ broad, panicles large terminal diffuse pubescent, bracts lanceolate pubescent soon deciduous, flowers white fragrant, calyx truncately 4-lobed glabrous or subglabrous, corol deeply 4-cleft, stigma clavate, apex flat and emarginate, fruit size of a bean dark-purple generally 1-seeded.—Phillyrea robusta, *Roxb. Fl. Ind.* i. 101. Visania robusta, *DC. Prod.* viii. 289. Olea robusta, *Wall. Cat.* 2822.

This tree is common in alpine jungles on the west side of this presidency, and in Bengal and Ceylon, and is found in Java; it is in flower all the year round; the wood is very hard and durable and useful for turnery purposes; it is generally of small size in this Presidency. Pieces of the bark are put into the toddy of Caryota urens to make it ferment.

2. Ligustrum Perottetii, *DC.*—A small tree or large shrub, glabrous or the young parts puberulous, leaves elliptic to ovate coriaceous glabrous acute or cuspidately acuminate at the apex, 1-2 inches long by $\frac{1}{2}$-$1\frac{1}{2}$ broad, petioles 3 lines long; panicles thyrsiform terminal lax or more or less compact, flowers fragrant, ovules pendulous, fruit oblong obtuse at both ends about as large as a small bean. *DC. Prod.* viii. *p.* 294. Ligustrum Perottetii and Neilgherrense, *Wight Icones tab.* 1244 & 1243.

Common on our higher mountains, Nilgiris, Anamallays and Pulnies, &c.; it is probably not distinct as a species from L. Nepalense, *Wall*, and is also closely allied to L. robustum; they might all, and perhaps some others, be reduced to varieties of one species.

Analysis, Pl. XIX, fig. 5.

Ligustrum Perottetii.

1. Apex of a branch showing the terminal inflorescence (life size.)
2. Portion of a branch of a panicle.
3. A flower.

4. Corol opene , showing its 4 lobes and 2 stamens.
5. Calyx, ovary, style and stigma.
6. Anthers, front and back view.
7. Ovary cut vertically, showing the pendulous ovules.
8. Ovary cut transversely, showing the 2 cells.
9. Fruit.

3. Ligustrum microphyllum, *Bedd.*—A shrub, young branches rather densely pubescent, leaves ovate or subelliptic glabrous submembranaceous sharply pointed at the apex, 4-9 lines long by 3-5 lines broad, or rarely up to 12 lines long, petioles $1\frac{1}{2}$-2 lines long, panicles pubescent terminal about $2\frac{1}{2}$ inches long, the branches very distant and few flowered, calyx truncated or very inconspicuously lobed glabrous, corol glabrous less than a line long 4-cleft about $\frac{1}{3}$ down, stigma 2-cleft, ovules pendulous, fruit not seen.

Coorg, about Kiggatnad. It is bold to propose a new species of Ligustrum ; this very minute leaved form is quite unlike anything described, and is constant ; it is very like a miniature form of the preceding 2 species, but if a variety of either, is most marked and curious.

CHIONANTHUS. Linn.

For Gen. Char. see letter-press to Pl. ccxxxvii. IX

1. Chionanthus intermedia, *Wight.*—For description, &c. see Pl. ccxxxvii. IX

2. Chionanthus Malabarica, *Wall.*—A small tree, young parts adpressedly pilose, leaves elliptic to obovate obtuse cuneately attenuated at the base, glabrous on both sides membranaceous to coriaceous obtuse or more or less pointed, sometimes with a long tapering acumen 3-6 inches long by 1-$2\frac{1}{4}$ broad, petioles 2-6 lines long ; inflorescence varying from a simple umbellate peduncle $\frac{1}{2}$ an inch long to a 6-8 branched cymose panicle 2 inches long, common rachis pilose or glabrous, bracts at the ramifications small acute deciduous pilose or glabrous, flowers fragrant generally quite sessile at the apex of the branchlets or very shortly pedicellate, calyx densely hairy or quite glabrous, petals pure white long linear induplicato-valvate so as to appear channelled and glabrous or subglabrous, united in pairs by the stamens, ovules attached to the centre of the axis, fruit ovate to obovate oblong apiculate, angled, 6-8 lines long. *Wall. in DC. Prod.* viii. 297 ;—*Wight Icones tab.* 1246.

Very common in our Western ghat forests from Canara down to S. Tinnevelly, also in Ceylon and Bombay.

Analysis, See Pl. ccxxxix.

1. A full flower.
2. The pair of petals joined by the anthers.
3. A single petal, margin inflexed.
4. Calyx, ovary and stigma.
5. Ovary cut vertically, ovules attached to centre of axis (they are sometimes suberect from a little below the centre.)
6. An anther.

A very variable plant both as to foliage and inflorescence. I have no hesitation about referring C. albidiflora Thw., to this species; as some of my S. Tinnevelly specimens have a long tapering acumen to the leaves and glabrous peduncles and calyx, and the flowers with pedicels. I have a large suite of specimens collected from S. Canara and Coorg down to S. Tinnevelly, and though the leaves and inflorescence look very different in some individuals, there are connecting forms, and they run one into another and could not well be separated, even as varieties ; some of my S. Canara specimens have the calyx densely white almost woolly and very coriaceous leaves, the apex quite rounded.

3. Chionanthus leprocarpa, *Thw.*—A middling sized tree, leaves subcoriaceous glabrous oblong acuminate almost veinless acute at the base, $2\frac{1}{2}$-$5\frac{1}{2}$ inches long by 1-$1\frac{3}{4}$ inch broad, petioles 2-3 lines long, cymes axillary racemoid few-flowered much shorter than the leaf very minutely glanduloso-pilose, flowers shortly pedicellate, calyx-lobes broad subtruncate ciliate, petals involute at the margins, fruit ovoid slightly leprous 1 inch long by 6-7 lines broad, purple, putamen rather woody. *Thw. En. Pl. Zey. p.* 189.

Ceylon, Central Provinces 3000-4000 feet elevation, rather rare.

4. Chionanthus rostrata, *Thw.*—A small tree, leaves subcoriaceous glabrous oblong with a long rostrate acumination, acute at the base, $2\frac{1}{2}$-4 inches long by $\frac{3}{4}$-$1\frac{1}{4}$ broad, petiole 3-$3\frac{1}{2}$ lines long, cymes axillary racemoid short few-flowered very minutely pilose, flowers short pedicelled, calyx-lobes rounded ciliate, fruit glabrous subfusiform 14 lines long 6 lines wide, putamen slightly woody. *Thw. En. Pl. Zey. p.* 189.

Ceylon, Hinidoon Corle.

5. Chionanthus Zeylanica, *Linn.*—A shrub or small tree, bark dark ash-colored with many elevated lighter colored specks, branches dichotomous very numerous, leaves short-petioled broad cuneiform lanceolar entire rather obtuse coriaceous smooth, about 3 inches long by 1 broad ; racemes axillary solitary scarcely half the length of the leaves, branches sub-opposite diverging 3 flowered, flowers small white (purple when dry) inodorous, calyx segments ovate obtuse villous, petals 4, united in pairs and induplicato-valvate, filaments short, ovary 4-sided ovate, ovules attached to the centre of the axis, style short, stigma obscurely 2-lobed, fruit oval or obovate size of a black currant succulent purple when ripe, putamen obovate rather thin marked with 4 ribs from the apex to the base and 4 small imperfect ones between. *Linn. Sp. Pl. ed. Willd.* i. 47. C. Zeylanica et dichotoma, *Roxb. Fl. Ind.* i. 107 *and* 108. Linociera purpurea et dichotoma, *DC. Prod.* viii. 297.

Kurnool mountains, and forests of our eastern coast ; Ceylon hotter parts of the island (called Gherriatta.)

6. Chionanthus Courtallensis, *Bedd.*—A small middling sized tree, perfectly glabrous, leaves oblong lanceolate entire waved at the margin more or less acute at the apex attenuated at the base, 5-8 inches long by 1½-2½ broad, prominently veined beneath, the costa and primary veins reddish, petioles 4-6 lines long reddish; spikes axillary or from the old axils, scarcely as long as the petioles, flowers 6-8 crowded subsessile about 3 lines long, calyx segments rounded glabrous, petals glabrous lanceolate, and as in the genus united in pairs with the margin induplicato-valvate, filaments short thickened upwards, ovary ovate, style short, stigma 2-lobed, ovules attached to the centre of the axis, fruit not seen.

Tinnevelly mountains above Courtallum, banks of a stream close to the Parapett coffee estate, 3000 feet elevation; the very short dense spikes well distinguish it from all the other species.

ORDER LIV—APOCYNEÆ.

Flowers regular, calyx free, divided nearly or quite to the base into 5 segments or sepals imbricate in the bud, bearing occasionally small glands or scales inside at the base. Corolla regular, with 5 spreading lobes, contorted imbricate or rarely valvate in the bud, the throat sometimes closed with a corona of scales, and frequently hairy. Stamens 5, inserted in the tube alternating with the corolla-lobes, anthers erect, turned inwards, 2-celled, the cells opening in longitudinal slits, either free and enclosed in a part of the tube usually swollen, or sometimes exserted and connate or connivent in a cone or ring round the style; the pollen not collected in masses but the auricles at the base of the anthers or the tips occasionally without pollen. Ovary of 2 carpels usually distinct, sometimes united in a 2-celled ovary with axile placentas, or in a 1-celled ovary with 2 parietal placentas; ovules several, few or numerous in 2 or more rows. Style single or styles 2 distinct at the base but united upwards; stigma usually thickened, mitriform membranous or bulbous at the base, terminating in a short entire or bifid point. Fruit either a single drupe or berry, or more frequently each carpel forms a follicle opening along the inner edge, or a drupe or berry. Seeds pendulous or rarely ascending or peltately attached, often bearing a coma or tuft of long hairs, usually albuminous; embryo straight, with flat or rarely convolute cotyledons. Trees, shrubs or twiners, or very rarely perennial herbs, the juice frequently milky. Leaves opposite or whorled, very rarely alternate, entire, without any or with small almost gland-like intrapetiolar or interpetiolar stipules. Flowers usually cymose, on simple or compound and paniculate peduncles, axillary or terminal. Bracts at the base of the branches of the inflorescence and of the pedicels usually very small, rarely larger, coloured and deciduous; bracteoles on the pedicels none or very rare and small.

This order is not of much importance to the forester. Alstonia scholaris, and the species of Wrightea and Holarrhena yield timber of some value; and Hunteria Zeylanica is a valuable timber tree in Ceylon; the other plants are mostly shrubs, or trees of no value. Besides the plants described in this work, the order is represented in our forests by many very large creepers often very destructive to young trees. Aganosma several species, Anodendron paniculatum, Chonemorpha macrophylla, Ellertonia Rheedii, Vallaris dichotoma, Beaumontiana Jerdoniana, and Chilocarpus Malabarica, are all very large creepers common in our western forests, and Heligme spiralis and Ichnocarpus frutescens small creepers, the latter common in hedges throughout the presidency; they are all figured by Dr. Wight in his Icones except the Chilocarpus, which I have lately figured in my Icones. Cleghornia is a large Ceylon creeper also figuerd by Dr. Wight; there are no herbaceous plants.

Of introduced plants Allamanda cathartica, a beautiful shrub with large yellow flowers common in all our gardens in the plains, is an introduction from tropical America, and it has run quite wild about our western-coast backwaters. The Oleander (Nerium odorum), a large showy shrub with white or rose, single or double flowers, is also to be found throughout the presidency, about gardens, temples, waste places, &c., it is an introduction from Northern India. Plumeria acutifolia (P. acuminata, Roxb.) and Plumeria alba, are two introduced milky weak trees or large shrubs with large, white, fragrant flowers and large leaves; they are common (particularly the latter) about gardens, temples, and waste places: the origin of the former is doubtful, the latter is from the West Indies.

Anthers wholly included in the corol tube and usually free.

Ovary with the carpels united from the base.

- Ovary 1-celled ... ... Willughbeia,
- Ovary 2-celled.
  - Unarmed trees or shrubs ... ... Ophioxylon.
  - Armed shrubs ... ... Carissa.

Ovary of 2 distinct carpels united only by the style.

- Ovules few (4-6) in each carpel, fruit of 1-2 indehiscent drupes or berries.
  - Placentas almost dividing each carpel into 2 cells, leaves long alternate or crowded, bracts large deciduous, flowers large ... ... Cerbera.
  - Placentas scarcely prominent, leaves opposite or whorled, bracts small.
    - Berries 2 one-or two-seeded, radicle superior ... ... Hunteria.
    - Drupes of several 1-seeded articles or small and 1-seeded, the endocarp not thick, radicle inferior ... ... Alyxia.
    - Drupes rather large, the endocarp of 2 bony longitudinal parallel lobes, hollow inside with 1-2 flat seeds between them ... ... Ochrosia.
- Ovules generally numerous, fruit follicular dehiscent or without any hardened endocarp.
  - Follicles short usually pulpy and scarcely dehiscent, seeds without hairs ... ... Tabernæmontana.
  - Follicles long and linear dehiscent.
    - Seeds hairy at both ends, leaves whorled ... ... Alstonia.
    - Seeds hairy at the apex only, leaves opposite ... ... Holarrhena.

Anthers exserted and cohering or connivent in a cone or ring round the stigma ... ... Wrightea.

WILLUGHBEIA. Roxb.

Gen. Char. Calyx 5-parted or deeply 5-cleft, without glands at the base, corol salver-shaped 5-cleft, lobes convolute, stamens 5 inserted in the tube, anthers ovate acute, filaments short, ovary free ovoid 1-celled, ovules numerous inserted on 2 parietal placentas, style cylindric, stigma ovoid or oblong thickened, berry large globose or ovoid pulpy, seed numerous nestling in pulp, bean-like, testa

thin and membranaceous, albumen none, cotyledons fleshy plano-convex, radicle very short. Shrubs, often climbing, tendril-bearing, milky, leaves opposite entire, cymes axillary and terminal.—Bentheka, *Neck.* Ancylocladus, *Wall.*

1. Willughbeia Ceylanica, *Wight.*—Shrubby, cirrhiferous, leaves elliptic to oval bluntly and often abruptly acuminate glabrous shining above dull rusty colored beneath, 3-4 inches long by 1½ broad, veins parallel, petioles 4-5 lines long; cymes axillary, flowers about ½ an inch long, calyx-segments broad ovate obtuse ciliate, corol deeply 5-cleft, stamens inserted on a thickened ring below the middle of the tube, filaments incurved, anther ovate pointed, ovary obtuse, stigma oblong acute, fruit spherical or a little pyriform yellowish-red, 4-5 inches in diameter. Seed oblong compressed, ¾ inch long ½ inch broad.—Chilocarpus Ceylanicus, *Wight Icones tab.* 1288. Willughbeia, *Thw. En. Pl. Zey. p.* 191.

This shrub has only been found in Ceylon; its large handsome fruit is a favorite food of monkeys.

Analysis, Pl. XX, fig. 4.

1. A portion of a branch in fruit.
2. A flower bud, pedicel and bracts.
3. Corol opened.
4. Anthers, front and side view.
5. Calyx, ovary, style and stigma.
6. Ovary cut transversely.
7. Ovary cut vertically.

OPHIOXYLON. Linn.

Gen. Char.: Calyx 5-6 parted without glands, segments erect, corol with a tube much longer than the calyx, lobes 5-6 convolute in æstivation, stamens 5-6 on the tube included, anthers oblong acute, filaments short; disk cup-shaped subentire, ovaries compressed connate at the base, ovules 2 in each cell attached a little above the base on the inner suture, style single, stigma large crown-like, berries connate at the base ovoid 1-seeded, albumen fleshy, cotyledons oval, radicle superior. Milky shrubs, leaves opposite or verticellate, flowers cymose in the axils of the upper leaves.

Ophioxylon densiflorum, *Wall.*—An erect shrub, glabrous, leaves opposite or verticelled 3-4 together, elliptic or oblong acute or shortly acuminate glaucous beneath penniveined, 3-6 inches long by 1¼ to 2½ broad, petioles 4-6 lines long, cymes about 3 inches long axillary or crowded in the upper axils (subterminal), flowers white inodorous about ½ inch long pedicelled, calyx segments 5-6 narrow linear or almost subulate, corol hypocrateriform, lobes 5-6 broad obovate obtuse, tube hairy in the throat, stamens 5-6 near the apex of the tube, filaments short, berries connate at the base, 3-6 lines long purple when ripe, seeds oblong smooth.—Tabernamontana densiflora, *Wall. Edn. Bot. Reg. v.* 15 *t.* 1273;—*DC. Prod.* viii. 373. Ophioxylon Ceylanicum et Neilgherriense, *Wight Icones plates* 1291-1292. O. macrocarpum, *Wight l. c. and Spicil.* ii. *p.* 53.

A very common shrub on the Nilgiris, Anamallays, Pulneys, and Ceylon mountains, 3000-6000 feet elevation.

Analysis, Pl. XX, fig. 2.

1. A flower bud much magnified.
2. A 6-merous flower.
3. A 5-merous corol opened to show the stamens.
4. Anther, front view.
5. Anther, back view.
6. Torus, ovary, style and stigma.
7. Ovaries cut vertically.
8. Ovaries cut transversely.
9. A branch in young fruit.

2. Ophioxylon serpentinum, *Willd.*; *Wight's Icones tab.* 849—is a small undershrub common throughout the presidency in the plains and up to 3000 feet elevation.

CARISSA. Linn.

Gen. Char. Calyx without glands, corolla-tube cylindrical, slightly swollen round the anthers; lobes spreading, contorted in the bud, the throat without scales. Anthers oblong or lanceolate, included in the corolla-tube. Ovary single, 2-celled; ovules several in each cell, in 2 rows; style filiform, with a more or less thickened or conical stigma. Fruit ovoid or globular, succulent, indehiscent. Seeds usually 1 or 2, without hairs, albuminous. Shrubs or trees, often armed with opposite axillary spines. Leaves opposite. Flowers in terminal or axillary cymes. Bracts very small.

1. Carissa carandas, *Linn.*—A small glabrous thorny tree or large shrub, branches and branchlets numerous 2-forked rigid and round, thorns in pairs at the divisions of the branches and branchlets and generally at every second pair of leaves, opposite straight horizontal strong smooth and sharp sometimes bifid, leaves oval or elongato-oval obtuse sometimes with a mucro, coriaceous shining above, paler beneath, 1½-2½ inches long by 1-1¼ broad, petioles 1-2 lines long, cymes terminal generally in pairs, common peduncles 8-12 lines long slightly puberulous bearing 3-many Jasmine-like pure white flowers, calyx, corol, &c. as in the generic character, calyx segments ovate acute pubescent 1½ lines long, corol tube 6-8 lines long pubescent towards the

apex, limb about 6 lines in diameter, lobes lanceolate acute pubescent on the outside, fruit single size of a small plum shining black when ripe. *Roxb. Fl. Ind.* i. 687.

Var. β congesta.—Leaves suborbicular, cymes short.—C. congesta, *Wight Icones tab.* 1289.

Var. γ paucinervia.—Leaves linear-lanceolate.—C. paucinervia, *Wight Icones tab.* 1290.

Common throughout the presidency and in Bengal and Ceylon, and much in use as a hedge plant, generally known by the native name Karàndà (hence its specific name); the fruit is eaten, and when raw it makes excellent tarts, preserves and pickles.

Analysis, Pl. XIX, fig. 6.

1. A portion of a stem showing one of the opposite pair of leaves and the 2 spines.
2. An axillary cyme, the peduncle cut short.
3. A flower bud showing the apex of the tube swollen round the anthers, and the lobes contorted.
4. A full flower.
5. Corol opened to show the stamens.
6. Calyx opened (no glands), ovary, style and stigma.
7. Anthers, front and back view.
8. Ovary cut vertically, ovules attached to centre of axis.
9. Ovary cut transversely, showing the 2 cells.
10. A fruit.
11. The same cut vertically.
12. Seed cut vertically.
13. Embryo.

2. Carissa diffusa, *Roxb.*—A small rigid thorny glabrous shrub, stem scarcely any, branches numerous dichotomous, spines opposite as in C. carandas, often bifid or twice bifid, leaves subsessile the alternate pairs larger without spines, cordate-ovate or roundish coriaceous and shining, terminating in a short subulate somewhat recurved point, cymes terminal rarely axillary many flowered, flowers pure white as in the generic character, fruit oval shining black about 4 lines long. *Roxb. Fl. Ind.* i. *p.* 689.

A common shrub in many parts of the presidency. C. hirsuta, *Roxb.* (villosa, *Roxb. l. c.* 690) is, I believe, only a tomentose variety of this species.

3. Carissa Dalzellii, *Bedd.*—A large glabrous shrub or small tree, branches dichotomous, thorns large recurved simple, leaves ovate to ovato-lanceolate or sometimes nearly elliptic from the base being attenuated, terminating at the apex in a subulate fine point, coriaceous very shining, 3-4 inches long by 1½-2 broad, petioles about 2 lines long inserted into prominent swollen protuberances on the branches, no thorns between the leaves; cymes terminal or axillary from the elongation of the branch generally 3 together on peduncles 6 lines long, pedicels 3 lines long, calyx-segments linear lanceolate 2 lines long minutely pilose and ciliate, flowers white, tube 1 inch long glabrous or sub-glabrous, lobes 6-7 lines long linear-lanceolate with a long fine point, fruit globose size of a large plum purple when ripe.—C. lanceolata, *Dalz. in Bombay Flora p.* 143 (not *R. Br.*)

This fine species is very common in Coorg and S. Canara, and on the Bombay ghats; it has much larger flowers than any of the other species, and its thorns are always recurved; the fruit is superior to that of C. carandas.

CERBERA. Linn.

Gen. Char. Calyx without glands. Corolla-tube cylindrical, slightly swollen round the anthers, and the throat usually somewhat dilated, without scales; lobes ovate, spreading, contorted in the bud. Anthers included in the corolla-tube. Ovary of 2 distinct carpels, united by a single style, each carpel incompletely divided by a very prominent placenta bearing 2 superposed ovules on each side; stigma conical, often 2-lobed at the tip. Fruit (from the abortion of one carpel) a single nearly globular drupe, flattened on one side, with a woody endocarp, usually 1-seeded. Seeds without hairs. Shrubs or small trees. Leaves alternate, crowded on the young branches. Flowers rather large, in terminal cymes or panicles. Bracts large, deciduous.

1. Cerbera Odallum, *Gœrtn.*—A glabrous, erect, tall, bushy shrub or tree, with thick herbaceous branches. Leaves oblong or lanceolate, acuminate, in some specimens 4 to 6 inch long, in others attaining 1 foot, narrowed into a rather long petiole, the primary veins transverse and parallel. Flowers white with a yellowish throat, sweet-scented, in a dense terminal pedunculate cyme. Bracts coloured, ½ to 1 inch long, very deciduous. Calyx-segments oblong or lanceolate, obtuse or acute, about ½ inch long, deciduous with the bracts. Corolla-tube usually above 1 inch long, but variable in length; lobes obtuse or shortly acuminate, from less than half as long to nearly as long as the tube. *Wight. Ic. t.* 441 (with a short corolla-tube). C. Manghas, *Bot. Mag. t.* 1845 (with a long corolla-tube.)

Very common about our western coast backwaters and similar places in Ceylon, and widely distributed over the maritime districts of India, the Archipelago, Australia and the Pacific Islands; in flower and fruit all the year round. The timber is soft, spongy, and white, and is used for charcoal; it is called in Tamil Kada-mà, and in Ceylon Gon-kadura. An oil is extracted from the seed which is burnt in lamps; the nuts are poisonous.

HUNTERIA. Roxb.

For Gen. Char. see letter-press to Pl. cclxv.

1. Hunteria Zeylanica, *Retz.*—For description, &c. see Pl. cclxv.

2. Hunteria Roxburghiana, *Wight.*—A glabrous shrub or very small tree, leaves linear elliptico-lanceolate ending in a long tapering blunt point, finely veined, subcoriaceous, very shining above dull beneath quite entire, 3½-6 inches long by 6 to rarely 15 lines broad, petioles 4-7 lines long, corymbs axillary and terminal much shorter than the leaves many-flowered, flowers about 5 lines long yellowish, bracts ovate acute, calyx-segments ovate acute, tube of corol 3 times as long as the calyx, hairy within where the stamens are inserted (a little above the middle), lobes ovate obtuse, berries ovoid much tapering at the base and with a short recurved point at the apex. *Wight Icones tab.* 1294.

Common about the foot of the Tinnevelly ghats, also found in Ceylon (Central Provinces,)

ALYXIA. R. Br.

Gen. Char. Calyx without glands. Corolla-tube cylindrical, slightly swollen round the anthers, the lobes spreading, contorted in the bud, the throat without scales. Anthers enclosed in the tube. Ovary of 2 distinct carpels, united by a single style, with a capitate or oblong stigma ; ovules few (about 4 to 6) in each carpel, in 2 rows. Fruit of 1 or 2 distinct drupes or berries, either ovoid or oblong and 1-seeded or each consisting of 2 or rarely more ovoid or oblong 1-seeded articles placed end to end. Seeds furrowed or concave on the inner face, albuminous, without hairs. Shrubs usually glabrous. Leaves in whorls of 3 or 4, rarely opposite. Flowers in small heads or clusters, or in short spikes or spike-like panicles, terminal or axillary, sessile or shortly pedunculate. Bracts very small. *Benth. Fl. Aust.* iv. *p.* 307.

1. Alyxia Ceylanica, *Wight.*—A glabrous shrub, branches dichotomous, leaves opposite obovato-elliptic, acuminate acute, about 3 inches long by 1½ broad, petioles 4-6 lines long, flowers yellow axillary solitary on longish pedicels, calyx-lobes ovate acute, corol-tube about 6 lines long border 9-10 lines in diameter, the lobes lanceolate, stamens on short filaments near the apex of the tube, drupes compressed each 1 to 3 inches long with 2 to 7 one-seeded articles, red when ripe. *Wight Icones tab.* 1293 ;—*Thw. En. Pl. Zey. p.* 191.

Only known in Ceylon, Ambagamwa district, 1000-2000 feet elevation.

Analysis, Pl. XX, fig. 5.

1. A flower bud.
2. A flower.
3. Corol opened.
4. Anthers, front and back view.
5. Calyx, ovary, style and stigma.
6. Ovaries cut vertically.
7. Ovaries cut transversely.
8. Fruit.

9—12. Seed, embryo and inferior radicle. (Copied from Wight's drawing.)

OCHROSIA. Juss.

Gen. Char. : Calyx without glands. Corolla-tube cylindrical, slightly swollen round the anthers, the lobes spreading, contorted in the bud, the throat without scales. Anthers enclosed in the tube. Hypogynous disk of minute glands or none. Ovary of 2 distinct carpels united by the style ; stigma conical ; ovules few (4 to 6) in each carpel, in 2 rows. Fruit a drupe, usually single by the abortion of the other carpel, somewhat compressed from front to back, the endocarp very thick and bony, divided longitudinally along the inner face into 2 thick cylindrical usually hollow portions, the real cell between them containing 1 or rarely 2 broad flat seeds. Albumen fleshy, cotyledons broad and flat, radicle superior. Trees, with abundant milky juice. Leaves opposite or whorled, the primary veins transverse. Flowers in pedunculate cymes, terminal or in the upper-most axils. Bracts very small.—(Bleekeria, *afterwards* Lactaria, *Hassk.*) *Benth. Fl. Aust.* iv. 309.

1. Ochrosia Borbonica, *Gmel.*—A tree with milky juice, quite glabrous, leaves in whorls of 3 or 4 obovate-elliptic or obovate-oblong obtuse or acute at the apex, cuneate at the base, coriaceous revolute at the margin, the transverse veins numerous and parallel, 2-6 inches long or even more, 1-2 broad, petioles 6-15 lines long ; cymes terminal many-flowered corymbose, bracts ovate acute 1-1½ lines long, calyx-segments foliaceous 2 lines long erect oblong obtuse glabrous but minutely ciliate at the margins, corol 5 lines long, drupes obovoid acute at both ends 1¼ inch long subcompressed, putamen thick and woody. *Gmel. Syst. Veg. p.* 439 ;—*DC. Prod.* viii. 356. Cerbera Borbonica, *Spr.* Ophioxylon ochrosia, *Pers.*

A sea-coast tree found about backwaters in Ceylon, where it is called Mudu-kadura ; it probably occurs about back-waters in Travancore, but I have not noticed it ; it also inhabits Bourbon and the Mauritius ; the wood is yellow.

TABERNAMONTANA. Linn.

Gen. Char. : Calyx with a ring of small linear glands inside at the base or eglandulose. Corolla-tube cylindrical, slightly swollen round the anthers, the lobes spreading, contorted in the bud, the throat without scales. Anthers enclosed in the tube. No hypogynous glands or scales. Ovary of 2 distinct carpels, united by the style ; stigma thickened, usually with a membranous ring round the base ; ovules numerous in each cell, in 3 or 4 rows or few ovuled. Fruit of 2 (or 1 by abortion) obliquely oblong or nearly globular carpels, distinct or rarely united at the base, more or less fleshy or pulpy, either indehiscent or tardily opening along the inner face. Seeds without hairs ; albumen fleshy. Trees or shrubs, the branches often dichotomous. Leaves opposite, one of each pair often smaller than the other, or verticelled in threes. Flowers in axillary cymes, usually 2 at the ends of the branches (in the axils of the terminal pair of leaves) or only in the axil of the smaller leaf. Bracts usually very small. *Benth. Fl. Aust.* iv. 310.

TABERNAMONTANA DICHOTOMA, *Roxb.*—A small tree or often only a large shrub, leaves opposite oblong and linear-oblong entire rather obtuse or acute or acuminate shining and coriaceous, 4-8 inches long by 1-2 broad, petioles 3-5 lines long united in a cup like stipulary ring which completely embraces the branchlets, all these parts generally resinous; racemes simple, compound single or in pairs in the extreme divisions of the branchlets often as long as the leaves, flowers rather remote long pedicelled large white scarcely fragrant, bractes scarcely any, calyx 5-parted, segments short semilunar resinous, corol-tube about 1 inch long, border 2½ to 3 inches across, lobes falcate, filaments short inserted about the middle of the tube, anthers saggitate, style ⅔ shorter than the corol-tube, stigma large with a tapering bifid apex, follicles recurved obtuse pretty smooth with the back concave, and the inner face very gibbous, where an elevated rib runs along each side of the suture, bright orange in color, 4-5 inches long and nearly 2 broad, seeds numerous irregularly cuneate oblong with a deep longitudinal groove on one side, nestling in scarlet pulp. *Roxb. Fl. Ind.* ii. *p.* 21;—*Wight Icones tab.* 433. Manghas lactescens, *Burm.*

Common in our western jungles and in Ceylon, in which latter place it is called Diwi-kaduru.

2. TABERNAMONTANA CORONARIA, *Roxb.*—A shrub about 6-8 feet high with numerous 2-forked branches, leaves opposite unequal elliptic obtusely acuminate smooth shining deep green membranaceous, margins rather waved, 4-6 inches long by 1-1¼ broad, petioles 3 lines long; cymes generally solitary from the divisions of the branchlets 1-2 inches long 1-8 flowered, pedicels erect 3-4 times as long as the calyx, flowers pure white about 1½ inch across very fragrant at night, calyx 5-toothed, segments ovate obtuse, corol funnel shaped, tube contracted towards the mouth and crowned with small yellow glands about 9 lines long, lobes obliquely ovate and curled at the margins, stamens a little below the middle of the tube, stigma with its apex bifid, follicles spreading recurved 1-3 inches long, seeds 3-6 irregularly oblong dark brown and striated nestling in red pulp. *Roxb. Fl. Ind.* ii. *p.* 23.

This shrub is found wild in our western jungles, and is much cultivated in gardens and about temples; one garden variety has double flowers and is a very favorite shrub. Dr. Roxburgh says that the pulp seems fit for yielding a very beautiful color.

3. TABERNAMONTANA CRISPA, *Roxb.*—A shrub, branches dichotomous, leaves opposite oblong-acute undulate glabrous, 4-8 inches long by 1¼-3 broad, petioles about 3 lines long; cymes arising from the forks few flowered, pedicels elongated, flowers large white, calyx-lobes ovate to cordate foliaceous about 1¼ inch in diameter, the tube 6-8 lines long crisped and curled. Stamens near the apex of tube where the latter is slightly inflated, follicles curled oblong acute 1¼ to nearly 2 inches long yellow when ripe, 3-6 seeded. *Roxb. Fl. Ind.* ii. 24.

Not uncommon on our Western ghats, called Pàlà.

4. TABERNAMONTANA VERTICELLATA, *Bedd.*—A large dichotomously branched shrub, quite glabrous, leaves in verticels of threes unequal in size, narrow elliptic lanceolate ending in a gradual very fine point, penniveined with marginal looping, 3-5 inches long by 1-1½ broad; cymes axillary much longer than the smaller leaves but rather shorter than the larger ones, dichotomous towards the apex, its branches cymose or racemose, flowers 4-5 merous white 4-6 lines long, bracts very small ovate deciduous, pedicels 2-4 lines long, calyx segments ovate acute less than a line long without glands inside, corol-tube infundibuliform slightly swollen near the apex at the insertion of the stamens and there hairy on the inside, the lobes ovate acute only one-fourth the length of the tube, stamens on very short filaments fixed to the centre of the back near the apex of the tube but quite included, ovary glabrous on a thick large torus, stigma large crown-like bituberculate at the base, 3-fid at the apex, carpels 1-2 come to maturity, ovate acute, 4-5 lines long, seeds generally only 1 in each.

Subalpine jungles, South Tinnevelly ghats; a very distinct and rather abnormal species.

Analysis, Pl. XX, fig. 3.

1. A flowering branch.
2. A 5-merous flower (life size.)
3. A 5-merous flower bud magnified.
4. A 4-merous flower.
5. A 5-merous flower.
6. Corol opened, stamens near apex of tube.
7. Anthers, front and back view.
8. Stigma.
9. Ovary cut vertically, erect ovules.
10. Calyx, torus, ovary, style and stigma.
11. Ripe fruit, life size (carpels 1-seeded.)

WRIGHTEA. R. BR.

For Gen. Char. see letter-press to Pl. ccxli.

1. WRIGHTEA TINCTORIA, *R. Br.*—For description, &c. see Pl. ccxli.

2. WRIGHTEA TOMENTOSA, *R. et Sch.*—A small milky tree, young shoots downy, leaves elliptic lanceolate or ovate acute tomentose on both sides, 2-3 inches long by 1½-2 broad, petioles about 1 line long; corymbs terminal small, pedicels 4-6 lines long, flowers about 1½ inches in diameter white with the corona orange colored, calyx segments pubescent ovate obtuse, the scales ovate obtuse, corol-tube gibbous somewhat fleshy, corona fleshy and lacerated into 10 obtuse fleshy segments, anthers pubescent sagittate sharp pointed, follicles about 8-9 inches long by 2 inches in circumference scabrous. *Wight Icones tab.* 443, and *Ill. tab.* 154. Nerium tomentosum, *Roxb. Fl. Ind.* ii. 6. W. pubescens, *Roth.*

A small tree found on both sides of the presidency, called Pàlà; the milky juice diluted with water dyes a tolerably good yellow. I have no specimens of this tree, and much doubt its being distinct from my No. 3; at least Wight's fig. in his Illustrations with a slight alteration to the corona, would answer well for that species.

3. Wrightea Wallichii, *DC.*—A small milky tree, leaves elliptico-ovate obtusely acuminate soft velvetty tomentose on both sides, 3-4 inches long by 1¼ to 1¾ broad, petioles 2-3 lines long; corymbs terminal short bracteated tomentose, flowers white, calyx segments tomentose broad ovate obtuse about 1½ lines long furnished inside with 5 glabrous obtusely rounded scales ⅔ as long as the segments, corol tube glabrous 3-4 lines long, lobes 6-8 lines long densely pubescent, corona of 10 large glabrous imbricate veined lobes equal or subequal in length all being about ¼ as long as the corol-lobes, those opposite the corol-lobes twice as broad as the others and with 3-5 irregular obtuse crenatures at the apex, the narrower ones 2-crenated, alternate with these 10 lobes and between them and the stamens there are 10 very short filiform entire lobes, anthers ⅓ longer than the larger corona-lobes, saggitate at the base acute at the apex and there tufted with hairs, hairy on the back, follicles 6-8 inches long cylindric rough with white spots. *DC. Prod.* viii. *p.* 403;—*Wight Icones tab.* 1296.

Common on the slopes of the mountains on the west side of the presidency up to 4000 feet elevation; the calycine glands are generally broad sometimes narrow, 4 of them are generally opposite 2 of the calyx-segments in pairs, and the fifth opposite a 3rd segment leaving two of the segments without any (as represented in *Wight Ill. tab.* 154.)

Wrightea Zeylanica, *R. Br.*—A small glabrous tree, leaves oblongo-lanceolate to obovate-oblong shortly and acutely acuminate glabrous, 1-2¼ inches long by ½-1¼ inches broad, petioles 2 lines long, corymbs terminal or subterminal few flowered, flowers white, calyx segments ovate, 1½ lines long, corol tube very slender 8-9 lines long glabrous, limb 9-10 lines in diameter, lobes puberulous obovate, corona white much laciniate from a little shorter to longer than the anthers. *R. Br.*;—*DC. Prod.* viii. *p.* 407. Wrightea antidysenterica, *R. Br. l. c.*;—*Thw. En. Pl. Zey. p.* 193.

This is only found in Ceylon, where it is called Saddu-idda; it is common on the south of the island; the flowers in shape are like our Holarrhena.

5. Wrightea angustifolia, *Thw.*—A small tree, leaves glabrous membranaceous linear-lanceolate obtuse, acute at the base 1½-4 inches long by ½-¾ inch broad, petioles about 1 line long, cymes slender, pedicels ½ an inch long, flowers minutely pubescent, calyx ¾ line long, lobes rounded subacute ciliate, corol-tube longer than the calyx-lobes linear oblong obtuse 3 lines long, corona glabrous 5 parted, its lobes linear opposite to and about as long as the anthers bifurcate to about the middle, the forks simple or sparingly laciniate at the apex, anthers a little pilose on the back, follicles cylindrical attenuated black shining 8-10 inches long, 2 lines in diameter. *Thw. En. Pl. Zey. p.* 193.

This has only been found in Ceylon, Damboul and Trincomallee.

ALSTONIA. R. Br.

For Gen. Char. see letter-press to Pl. ccxlii.

1. Alstonia scholaris, *R. Br.*—For description, &c. see Pl. ccxlii.

2. Alstonia venenata, *R. Br.*—A glabrous shrub, leaves in verticels of 3 or 4 narrow linear-lanceolate with a long very fine point at the apex and very gradually attenuate at the base, 4-9 inches long by 10-14 lines broad, with a beautifully parallel venation of quite simple or rarely forked primary veins which run into a transverse vein close to the margin, petioles 8-9 lines long (if a portion of the very attenuated base of the leaf may be allowed as such), cymes terminal dichotomous much shorter than the leaves, flowers pure white, calyx glabrous but ciliate at the margins scarcely a line long, segments ovate subacute, corol tube 1 inch long glabrous swollen just below the apex where the stamens are situated, but when in bud much contracted at its apex (or base of the lobes), lobes ½ an inch long, tube very hairy inside at the insertion of the stamens, anthers on very short filaments, stigma large crown-like, disk of 2 linear ligulate scales as long or nearly as long as the ovaries and alternate with them, follicles 2-3 inches long. *R. Br. Lodd. Bot. cat.* i. 180;—*Wight Icones tab.* 436. Blaberopus, *DC. Prod.* viii. *p.* 411.

This very beautiful shrub is common on the eastern slopes of the Nilgiris (3000-4500 feet elevation), and in other localities in our western forests. I never saw it more than 8 feet or so in height; it would be a showy garden plant.

HOLARRHENA. R. Br.

Gen. Char.: Calyx 5-parted, lobes lanceolate acuminate furnished with glands inside at the base or eglandulose, corol hypocrateriform without appendages, lobes oblong or linear convolute, stamens inserted near the base or about the middle of the corol-tube, filaments very short. Anthers lanceolate apiculate, much longer than the filaments, ovaries 2 ovate acute, style 1, short, stigma oblong abruptly acuminate simple, follicles slender, seed numerous cymose at the apex, albumen none, embryo straight, radicle superior cylindrical, cotyledons much larger than the radicle involutely plicate at the margins. Shrubs or small trees, leaves opposite or sub-opposite entire short-petioled glabrous or pubescent, cymes terminal or axillary corymbose.

1. Holarrhena antidysenterica, *Wall.*—A large shrub glabrous or pubescent, young branches downy or glabrous, leaves opposite or sub-opposite glabrous on both sides or densely velvetty beneath and glabrous or slightly pilose above, from very broadly ovate almost orbicular to elliptic-ovate, rounded at the base obtuse or obtusely acuminate at the apex, 4-8 inches long by 2-5 inches broad, petioles 2-3 lines long, primary veins prominent; cymes many flowered terminal axillary or often leaf opposed, when the leaves are subalternate glabrous puberulous or very pilose, flowers white, pedicels 6-9 lines long, calyx-lobes ovate acute ciliate about 1½-2 lines long furnished with 5-10 small ovate or linear glands on the inside at the base, alternate singly or in pairs with the segments, corol-tube about 6 lines long rather swollen at the base where the stamens are situated, more or less hairy, lobes 5-6 lines long oblong obtuse, glabrous or more or less hairy, follicles slender about 1 foot long. *Wall. List.* 1672 *in DC. Prod.* viii. 413. H. pubescens, *Wall.*, and H. codaga, *G. Don. in DC. l. c.* Codaga pala, *Rheede.*

This shrub is common throughout the presidency, and in Bombay, Bengal, and Birma. H. codaga only differs in being pubescent; the glabrous form is more common on our eastern coast, the pubescent state on the western; the wood is used for the purposes of the lathe.

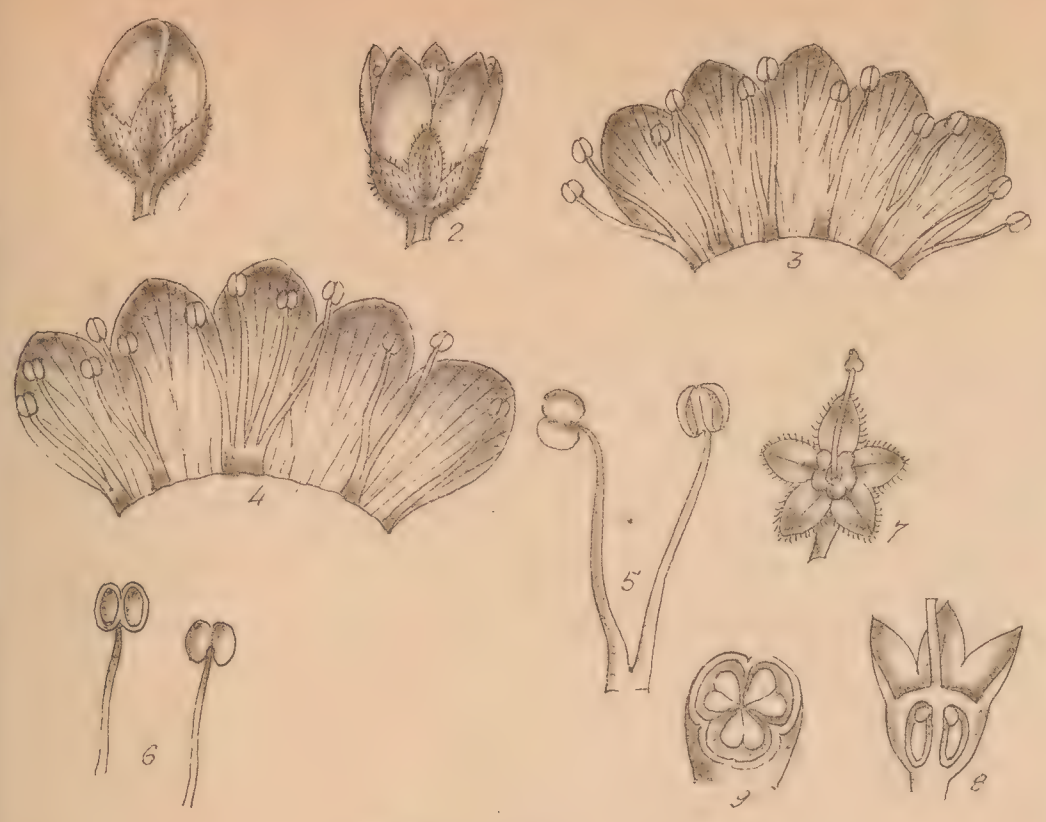
Analysis, Pl. XX, fig. 6.

1. A flower bud maguified.
2. A flower,
3. Flower opened, stamens near the base of tube, no appendages.
4. Anther, back view.
5. Anther, front view.
6. Calyx and its 5 glands (sometimes 10 are present in pairs), ovaries, short style and stigma.
7. Ovaries cut vertically.
8. Ovaries cut transversely.
9. Seed.
10. Small portion of a cyme.

2. HOLARRHENA MITIS, *Br.*—A middling sized tree glabrous, leaves lanceolate abruptly attenuate at the base and gradually so at the apex with the acumen obtuse, 2-3 inches long by 6-8 lines broad; petioles 2-3 lines long, cymes dichotomous 5-12 flowered, flowers white, pedicels $\frac{1}{2}$ the length of the flowers, bracts minute, calyx-segments lanceolate, corol lobes narrow linear shorter than the tube, which is 5 lines long. *DC. Prod.* viii. *p.* 413. Carissa mitis, *Vahl.*

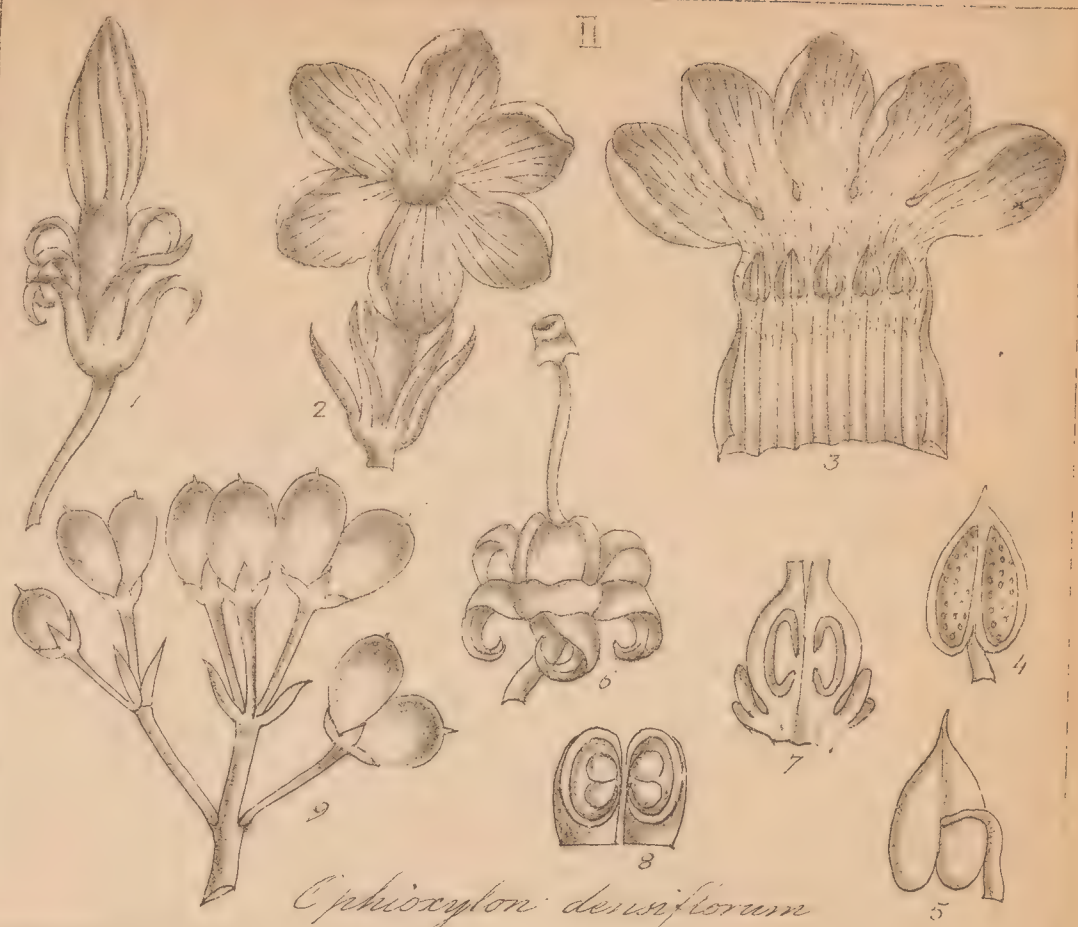
Ceylon, not uncommon up to 1500 feet elevation, called Kiri-walla. Peninsula? I have never met with this species; the timber is said to be light in weight, of a pale color and fine close grain, and to be used for inlaying cabinet work.

I



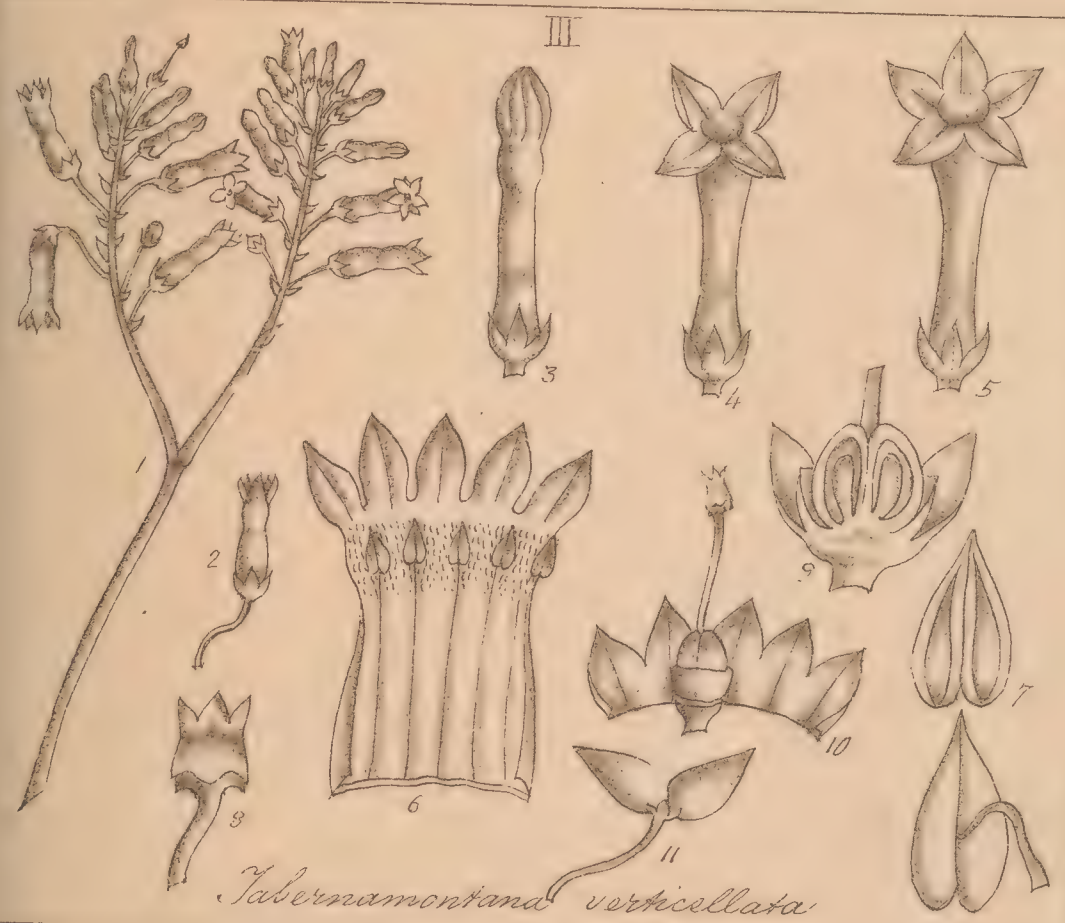
Symplocos oligandra

II



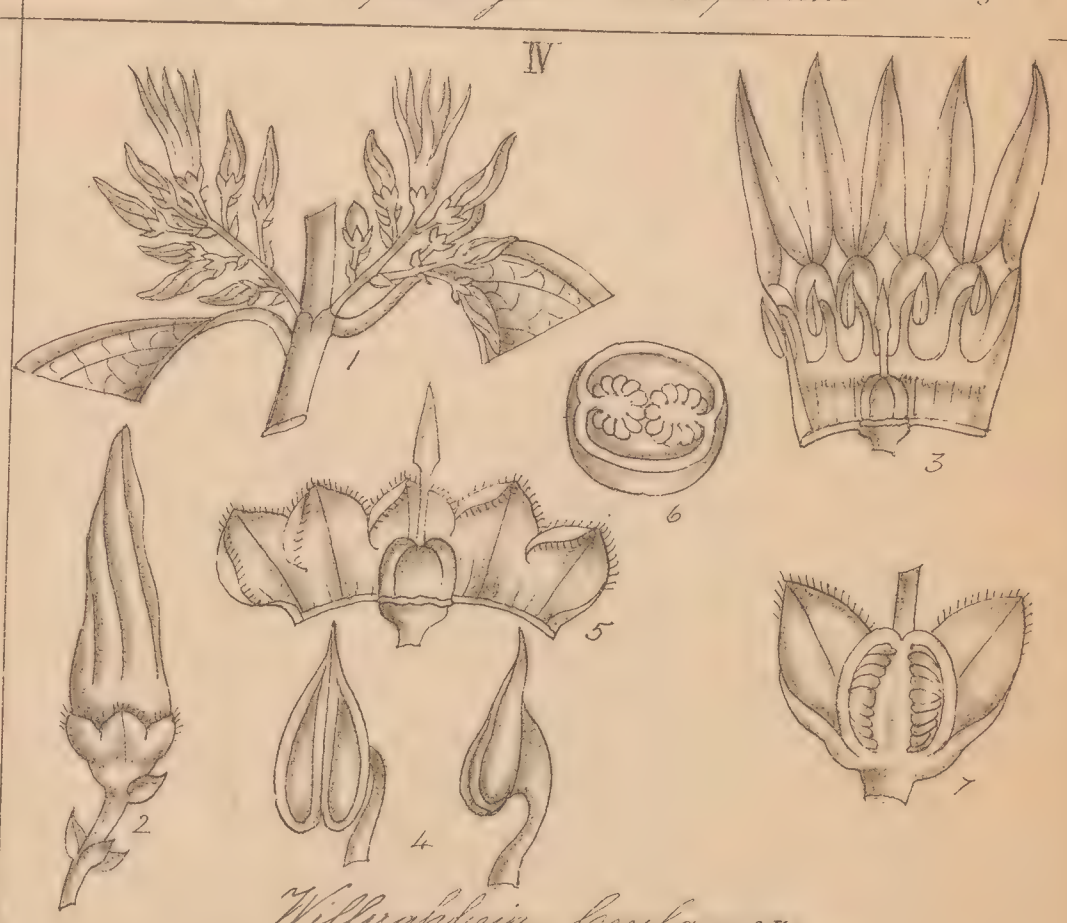
Ophioxylon densiflorum

III



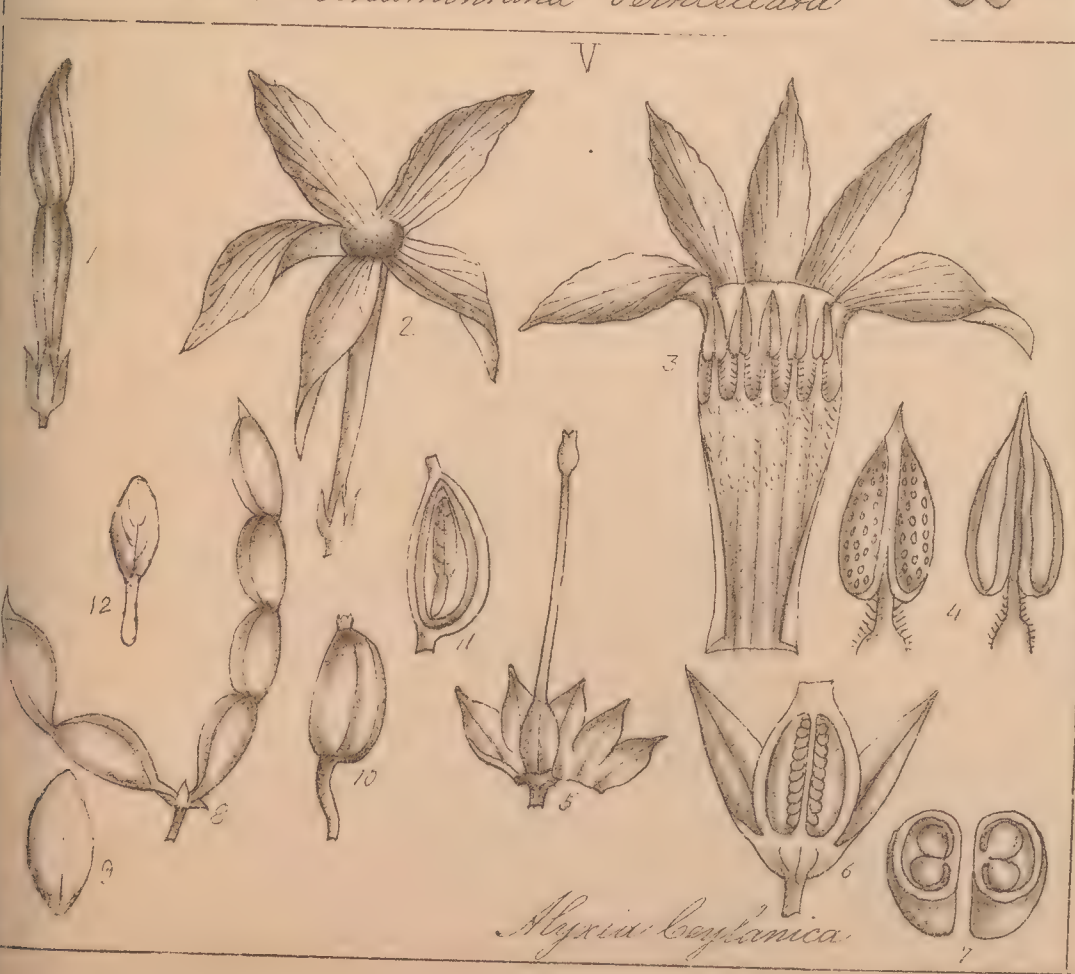
Tabernamontana verticellata

IV



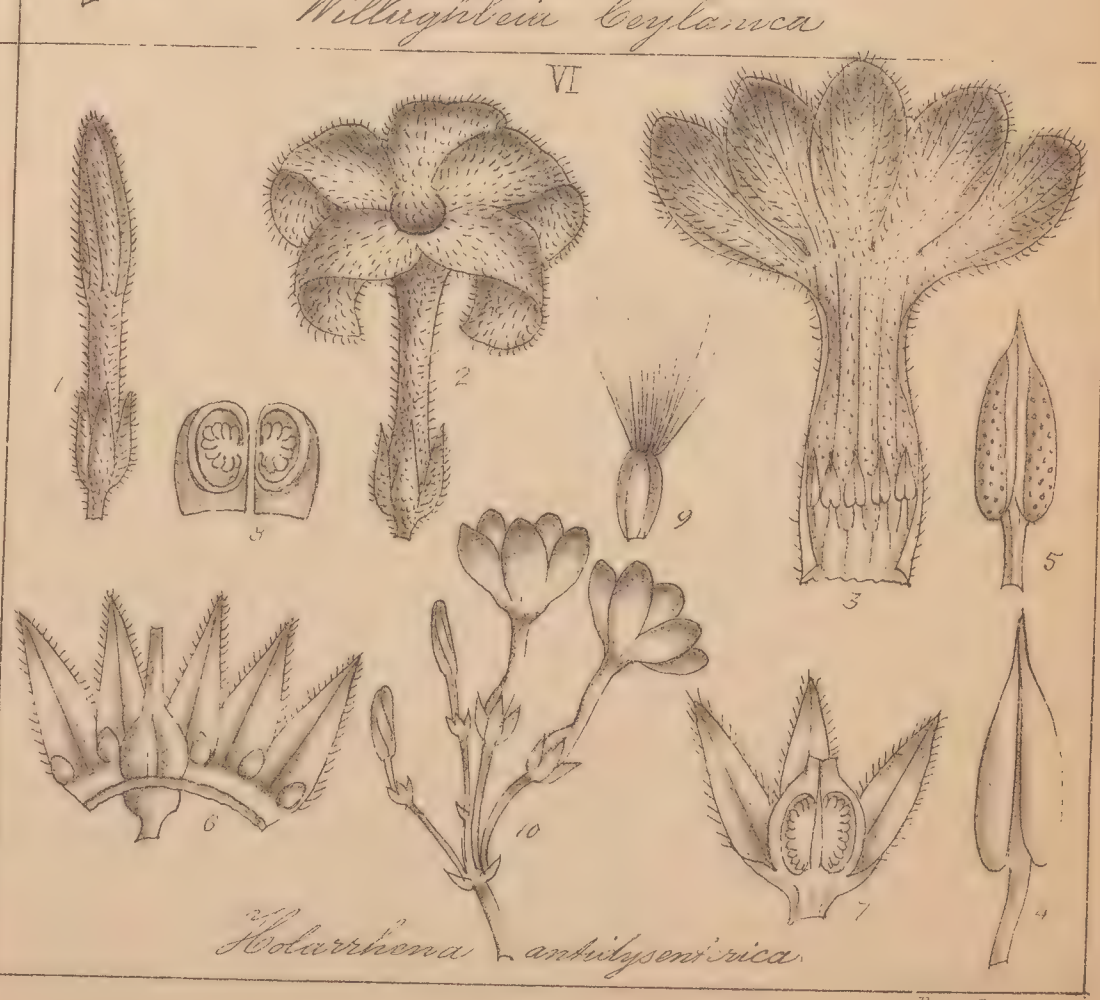
Willughbeia Ceylanica

V



Alyxia Ceylánica

VI



Holarrhena antidysenterica

Dumphy Lith:

ORDER LV—LOGANIACEÆ.

Gen. Char. Flowers regular. Calyx free with 4 or 5 teeth, lobes or segments, very rarely reduced to 2 or in a very few species 6 or 7. Corolla with 4, 5, (or rarely more than 5) lobes valvate contorted or otherwise imbricate in the bud. Stamens as many as corolla-lobes, alternate with them, inserted in the tube (or very rarely reduced to 1), anthers 2-celled, the cells opening longitudinally. Ovary free, 2-celled or very rarely 3-to 5-celled or imperfectly divided, style single or separating into 2 at the base, with an entire or 2-lobed stigmatic summit; ovules 1 or more in each cell of the ovary or to each placenta. Fruit a berry or capsule. Seeds albuminous. Embryo straight, often oblique, with leafy or small cotyledons. Trees, shrubs, climbers, or rarely herbs. Leaves opposite usually connected by interpetiolar stipules or at any rate by a raised line.

This order is not one of much importance to the forester. The genus Strychnos yields 2 well known trees, the Nux vomica and the Clearing nut (common throughout the Presidency) and several large climbers (western forests). Fagræa yields 3 or 4 ornamental but useless trees with large whitish flowers (western forests and Ceylon). Buddleia one common shrub or very small tree, and Gærtnera 5 shrubs (Ceylon). Besides these the genus Gardneria is represented in our western forests by 1 large climber, G. ovata, the genus Mitreola by a small herb, M. oldenlandioides (western jungles), and the genus Mitrasacme by 2 minute herbs, M. Indica, Wight, and M. capillaris, Wall, (fields, &c., on the west coast.) The order is closely allied to Rubiaceæ in some of its genera, but differs in its free ovary, some species of Gærtnera might well be set down as Psychotrias if this is not borne in mind.

* Ovules several in each cell.
  Corol valvate, fruit a berry with a hard rind... .. .. STRYCHNOS.
  Corol imbricate.
    Fruit a capsule ... ... BUDDLEIA.
    Fruit a berry ... ... FAGRÆA.
* Ovules solitary in each cell .. .. GÆRTNERA.

STRYCHNOS. LINN.

For Gen. Char. see letter-press to Pl. ccxliii.

1. STRYCHNOS NUX-VOMICA, *Willd.*—For description, &c. see Pl. ccxliii.

2. STRYCHNOS POTATORUM, *Linn.*—A good sized tree, bark deeply cracked, no spines or tendrils, leaves ovate to elliptic acute membranaceous glabrous somewhat 3-5-nerved at the base, penniveined above, about 3 inches long by 1½ broad, petioles 2-3 lines long, stipules connate, corymbs axillary or from the old axils, much shorter than the leaves, flowers fragrant greenish-yellow 4-5 lines long, calyx scarcely more than 1 line long, corol hairy in the jaws, berry shining black when ripe, globose, 7-8 lines in diameter 1-seeded. *Roxb. Fl. Ind.* i. 576;—*Wight Ill. tab.* 156.

This tree is well known as *the Clearing nut*, and is called in Telugu *Chilla*, and in Ceylon Injini; it is not uncommon throughout this Presidency, and in Ceylon, in the dry forests of the plains and lower slopes of hills up to 3000 feet, and is also found in Madagascar. The timber is hard and durable, and much in use for ploughs, building purposes, cart wheels, &c. The ripe seeds are dried and sold in every market to clear muddy water, one of the seeds is rubbed for a minute or two round the inside of the chatty and the water soon becomes clear.

STRYCHNOS CINNAMOMIFOLIA, *Thw.*, and S. COLUBRINA, *Linn.*, are gigantic creepers in our western forests, and I have one or two allied (doubtfully distinct) species (large climbers). S. LAURINA and S. MINOR are Ceylon climbers.

BUDDLEIA. LINN.

Gen. Char. Calyx 4-toothed or 4-lobed. Corolla with a short or long tube and spreading or rarely erect limb of 4 short broad lobes, imbricate in the bud. Stamens 4, the anthers almost sessile. Ovary 2-celled, with several ovules in each cell. Style entire. Capsules opening septicidally in 2 entire or bifid valves, leaving the placenta free in the centre. Seeds numerous, small, more or less flattened or obscurely winged. Shrubs or rarely trees, with more or less of a mealy or woolly tomentum, rarely quite glabrous. Leaves opposite, entire or toothed. Flowers in cymes or clusters, either axillary or in terminal racemes or panicles, in some species occasionally, but rarely pentamerous.

1. BUDDLEIA ASIATICA, *Lour.*—A small tree or shrub, with the young branches, inflorescence, and under side of the leaves covered with a white or yellowish tomentum, sometimes very thin and close or mealy, sometimes very thick and almost woolly. Leaves lanceolate, acuminate, 3 to 6 inches long, entire or serrulate, on a very short petiole, usually glabrous on the upper side. Flowers in dense clusters, in racemes of 3 to 8 or 10 inches long, which are sometimes single and terminal, but more frequently 3 or more together at the ends of the branches or in the upper axils, forming a terminal panicle. Calyx usually nearly 1 line long, cottony or woolly. Corolla-tube shortly exceeding the calyx; the lobes very short, obtuse or spreading. Capsule 2 to 3 lines long, usually spreading or reflexed. *Benth. Fl. Hongkong, p.* 231. B. neemda, *Ham. Benth. in DC.* x. 446. B. discolor, *Roth.*;—*Wight's Icones* 894. B. Missionis, *Wall.*?

A common shrub or small tree in hilly districts throughout the Presidency, up to 5000 feet elevation, and a very ornamental plant; it extends to Nepal, Malacca and the Malay Archipelago.

Analysis of Genera, Pl. XXI, fig 4.

1. A portion of a raceme.
2. A flower bud with its bracteole, lobes of corolla imbricate.
3, 4. Full flowers.
5. Corolla opened.

6. Calyx opened to show ovary and style.
7. Anthers, front and back view.
8. Ovary cut vertically.
9. Ovary cut transversely.
10. Fruit. (Drawn from living specimens collected on the Nilgiris.)

FAGRÆA. Thunb.

For Gen. Char. see letter-press to Pl. ccxliv.

1. Fagræa Coromandelina, *Wight.*—For description, &c. see Pl. ccxliv.

2. Fagræa obovata, *Wall.*—A small or middling sized glabrous tree often subscandent, leaves ovate or obovate cuneate subapiculate tapering at the base and slightly decurrent on the petiole, 5-7 inches long thick almost fleshy without veins, petioles 1 inch long flattened above concave at the base dilated at the base into an erect concave ligula, peduncles axillary and terminal about 5 together, elongated 3-flowered, flowers white or yellowish-white fragrant, calyx-segments broad ovate obtuse, corol about 2 inches long infundibuliform gradually widening upwards, lobes obtuse spreading, berry ovate brown shining, the numerous brownish seeds immersed in soft pulp. *Wall. in Roxb. Fl. Ind. (Ed. Wall. & Carey) vol.* ii. *p.* 33. F. Malabarica, *Wight Icones tab.* 1317.

Not uncommon in our western moist forests and in Ceylon and Silhet ; it is nearly allied to the last species but differs in its smaller flowers and number and length of the peduncles, and has a very different appearance.

3. Fagræa Zeylanica, *Thunb.*—is a Ceylon tree closely allied to obovata, but differing in its less scandent habit, much longer flowers, and more rounded fruit. Ceylon, Central Provinces, called Attamburu.

4. Fagræa Gardneri, *Thw.*—is a Ceylon scandent plant allied to obovata, with weaker more scandent branches, more crowded leaves, longer calyx, and its pair of bracteoles at its immediate base instead of ½ way down the pedicel. All 4 species are closely allied, and perhaps rather varieties than distinct species.

GÆRTNERA. Lam.

Gen. Char. Calyx 5-or rarely 4-lobed or toothed. Corolla-tube cylindrical; the limb of 5 or rarely 4 lobes, valvate in the bud. Stamens as many, included in the tube. Ovary 2-celled, with 1 erect ovule in each cell. Fruit succulent, indehiscent, but readily separating into 2 cocci. Shrubs or small trees. Leaves opposite, entire, with interpetiolar stipules often forming a short sheath within the leaves. Cymes or panicles terminal, trichotomous.—Sykesia, *Arnt.*

A genus not distinguishable from Psychotria in Rubiaceæ, except by its superior ovary and fruit and the former is sometimes slightly inferior at its base.

1. Gærtnera Kœnigii, *Arnt.*—A large shrub, young branches minutely puberulous, leaves ovate to oblong or obovate suddenly and shortly acuminate rather attenuated at the base glabrous, 3-7 inches long by 1-3 broad, petioles 3-6 lines long, stipules very large sheathing entire or bifid at the apex; cymes bracteate compound about as long as the leaves puberulous as are the calyx and corol, pedicels short with a bract at the base, calyx small truncate and entire to more or less 5-lobed furnished with a bracteole at its base, corol greenish about 3 lines long hairy in the jaws, stamens inserted about the middle of the tube, filaments hairy very short with the style elongate or as long or longer than the corol with the style generally short, stigma 2-lobed, lobes flat on the inner face, fruit subspherical bluish 5-6 lines in diameter. *Wight Icones tab.* 1318 ; (with long filaments) Gært. divaricata, *Thw. En. Pl. Zey.* 425 ; (with short filaments) Pristidia, *Thw. l. c. p.* 149. Sykesia Kœnigii, *Arnt. pug.* 35. G. acuminata, thyrsiflora, et oxyphylla ? *Benth. Linn. Journ. vol.* 1. *p.* 112.

Ceylon, very abundant close to Galle, also in the Central Provinces; quite a Psychotria, except in its superior fruit, and nearly superior ovary, the filaments are sometimes long and sometimes short as in many Rubiaceæ.

Analysis of Genera, Pl. XXI, fig. 3.

1. A stipule.
2. A flower bud.
3. A full flower, corol lobes valvate.
4. Calyx, ovary, style and stigma.
5. Corol opened shewing the stamens with short filaments, some flowers have elongated filaments and a shorter style (as in Psychotria and Hedyotis in Rubiaceæ.)
6. Anthers, front and back view.
7. Ovary cut transversely, 2 cells.
8. Ovary cut vertically, ovules erect, this shews the ovary slightly inferior at its base which it generally is, but the fruit is wholly superior. (Drawn from dried specimens collected near Galle in Ceylon.)

2. Gærtnera rosea, *Thw.*—A shrub 8-10 feet high, ramuli bicostate, leaves elliptic or ovato-lanceolate with a long and acute acumination, narrowed at the base into a short petiole, 1¼-3 inches long by ¼-1¼ inch broad, stipules keeled biaristate joined into a tube, flowers terminal tern sessile or subsessile, calyx tubular 1 line long irregularly 4-6 denticulate, corol 8-10 lines long rosy-purple, lobes 4 linear much shorter than the tube, fruit subspherical pale blue 4-5 lines in diameter. *Thw. En. Pl. Zey. p.* 201.

Ceylon, Ambagamwa and Saffragram districts, up to 2000 feet elevation.

3. Gærtnera Walkeri, *Arnt.*—A shrub 8-10 feet high, branches terete glabrous, leaves oblong or lanceolate with a long acute acumination, 1½-4 inches long by ½-1½ inches broad, petioles 2-5 lines long, stipules joined into a tube, truncate or

shortly acuminate or bifid, cymes terminal glabrous generally 5-flowered about equal to the leaves, corol-tube elongate villous within, fruit subspherical blue. *Wight Ill.* ii. *tab.* 156*b*., and *Thw. En. Pl. Zey. p.* 202. Sykesia Walkeri, *Arnt. pug.* 36. 354.

Ceylon, Central Provinces, 3000-4000 feet elevation.

4. Gærtnera Gardneri, *Thw.*—A shrub 8-10 feet high, ramuli terete minutely puberulous, leaves glabrous narrow-lanceolate acutely acuminate, acute at the base, short-petioled, 1-2½ inches long by 2-5 lines broad; stipules sheathing a little acuminate and bifid, cymes puberulous generally 3-flowered and shorter than the leaves, flowers erect and with the fruit very similar to the preceding species but a little larger. *Thw. En. Pl. Zey. p.* 202.

Ceylon, Central Provinces, 5000-7000 feet elevation.

5. Gærtnera ternifolia, *Thw.*—A shrub 4-6 feet, ramuli puberulous 3-costate, leaves verticelled in threes or sometimes only opposite glabrous rigid linear mucronate, acute at both ends, veinless, short-petioled, 4-7 lines long by ½ to 1 line broad, costa prominent beneath, stipules short acuminate joined at the base; flowers terminal solitary, pedicels shorter than the leaves puberulous, calyx shortly-campanulate acutely 5-toothed puberulous bracteolate at the base. Corol white 5-6 lines long a little campanulate glabrous outside villous within the tube, lobes shorter than the tube, stamens inserted at the middle of the tube, berry subspherical blue 4 lines in diameter. *Thw. En. Pl. Zey. p.* 202.

Ceylon, Ambagamwa district near Adam's Peak, 4000-5000 feet.

ORDER LVI—BORAGINEÆ.

Flowers regular or nearly so. Calyx free, of 5 rarely 4 or 6 or more divisions or teeth or rarely irregularly split. Corolla with a long or short tube, and 5 rarely 4 or 6 or more lobes, imbricate or induplicate in the bud, stamens as many as corolla-lobes or very rarely fewer, inserted in the corolla-tube and alternate with its lobes; anthers 2-celled, the cells opening in longitudinal slits or rarely in terminal pores. Ovary superior, entire or 4-lobed rarely 2-lobed, either 4-or 2-celled with 1 ovule in each cell or 2-celled with 2 ovules in each cell, (in all cases formed of 2 carpels); style terminal or inserted between the lobes; ovules laterally attached, ascending or pendulous. Fruit either a drupe with the endocarp entire or separating into 2 carpels or 4 pyrenes, or dry and separating into 4 rarely 2 nuts. Seed with a thin testa; albumen none or scanty; embryo straight; cotyledons flat and rather thick or rarely folded; radicle short. Herbs, usually rough with coarse hairs, or in the drupaceous genera sometimes trees or shrubs with a softer indumentum or glabrous. Leaves alternate or very rarely opposite, usually undivided, entire or toothed, very rarely deeply lobed. Flowers in one-sided spikes or racemes, rolled back when young and often forked or dichotomous or rarely in irregularly-branched panicles or solitary. Bracts often not immediately subtending the pedicels and sometimes entirely wanting; bracteoles very rarely present.

This order is of little importance to the forester. Cordia gives 8 trees in this Presidency and 2 in Ceylon, chiefly small trees of no value. Ehretia is represented by 5 small trees; 3 introduced Cordias are found in our gardens. Of plants not coming within the scope of this Flora, Rhabdia viminea (Ehretia cuneata, Wight Icones tab. 1385) *is an under shrub common in beds of rivers, and the following genera are represented by herbaceous plants, Tournefortia, Heliotropium, Coldenia, Cynoglossum, Trichodesma. Cordia Macleodii is a valuable timber tree in the Nagpore country, where it is known by the name of Deyngan, but it does not extend to our limits.*

Tribe I.—Ovary entire, style terminal, fruit drupaceous or dry.

Fruit a drupe.	
Style twice forked...	Cordia.
Style 2-lobed	Ehretia.

CORDIA. Plum.

For Gen. Char. see letter-press to Plate ccxlv.

1. Cordia Wallichii, *G. Don.*—For description, &c. see Plate ccxlv.

2. Cordia Myxa, *Linn.*—A handsome tree, with a dense coma, glabrous or the foliage scabrous-pubescent. Leaves on rather long petioles, from ovate to orbicular, very obtuse or shortly acuminate, entire or irregularly sinuate, 3 or 5-nerved at the base, usually 2 to 3 inches long. Flowers not large, polygamous, in loose pedunculate cymes or panicles. Calyx membranous, about 3 lines long, entire and closed over the corolla in the bud, opening irregularly into short lobes without prominent ribs when the flower expands, hardened, broadly cup-shaped, and irregularly and broadly toothed or lobed under the fruit. Corolla-tube oblong-cylindrical, slightly contracted at the throat, nearly as long as the calyx, glabrous inside and out; lobes narrow, recurved, as long as the tube. Stamens exserted, but not exceeding the corolla-lobes; anthers oblong-linear. Style short, with 4 long filiform branches stigmatic along the inner side. Drupe ovoid or nearly globular, pale yellow the pulp very viscid, the putamen very hard, usually 1 or 2-celled, with 1 seed in each cell. *Wight. Illustr. t.* 169. C. dichotoma, *Forst. R. Br. Prod.* 498. C. Brownii, *DC. Prod.* ix. 499. C. latifolia, *Roxb. DC. Prod.* ix. 478. C. ixiocarpa, *F. Muell. Fragm.* i. 59.

A common tree in many parts of the presidency and much in cultivation about native villages, it is also widely dispersed over tropical Asia and in Queensland and tropical Africa. Specimens with all the flowers male have usually a looser more slender inflorescence than those with all or nearly all perfect flowers. The tree is called Gondee and Lusora in Hindostanee, Irkee and Peddà bōkee in Teligu; and Verasu in Tamil. The fruit is eaten, and is the Lebestan of the Indian Materia Medica, being employed as a pectoral medicine, it is very mucilaginous. The wood is said to be one of the best for producing fire by friction, and I have known ploughs made out of it, but it is generally set down by the natives as a very inferior timber only fit for firewood, though some other Cordias yield good timber.

3. Cordia octandra, *DC.*—A small tree, branches numerous much spreading, bark smooth olive-colored, leaves alternate on longish petioles, ovate-cordate serrate acuminate a little harsh with few hairs, 4-6 inches long by 2-4 broad. Flowers white middling sized in long peduncled dichotomous cymes, calyx subcylindric 3-5 toothed hairy inside, corol with a cylindric tube as long as the calyx, lobes 7-9 oblong recurved, filaments about 8 hairy inserted on the tube of the corol below its middle. *DC. Prod.* ix. 477. C. serrata, *Roxb. Fl. Ind.* i. 591 *(*not *Juss.)*

Travancore, at no elevation.

4. Cordia monoica, *Roxb.*—A small tree, bark greyish, leaves alternate ovate slightly repand, 3 rarely 5-nerved, very scabrous, about 3 inches long by 2 broad, petioles round scabrous about 1 inch long, flowers male and hermathrodite mixed rather small white, male with rudiment of an ovary but no style. Cymes short two-forked with the branchlets recurved, drupe size of a cherry acute yellow full of glutinous pulp (as in Myxa.) *Roxb. Fl. Ind.* i. 592.

Very common in many of our forests (up to 2000 feet) on both sides of the presidency, it is a scraggy tree of no value.

5. Cordia polygama, *Roxb.*—A small tree, bark pretty smooth dark olive-colored, branches spreading, leaves alternate petioled ovate to cordate entire or slightly scollop-toothed, soft and villous when young, scabrous in age, 1-6 inches long by ¾ to 4½ broad, flowers male and hermathrodite on different trees, the cymes pubescent, in the male more divided. Calyx narrow-campanulate 4-5 toothed villous outside, corol funnel-shaped, lobes 4-5 linear revolute. Stamens 4-5, ovary ovate, in the male spherical and abortive and without a style, drupe oval as large as a black-currant, smooth yellow filled with mucilaginous pulp, nut very hard ovate longitudinally perforated through the centre. *Roxb. Fl. Ind.* i. 594.

Mountains on the eastern side of the Presidency.

6. Cordia Rothii, *Ræm. and Sch.*—A small tree, leaves sub-opposite entire from lanceolate obtuse to spathulate tapering at the base scabrous, 3-5 inches long by 1-1½ inch broad, petioles channelled 3-5 lines long, corymbs dichotomous divaricate, flowers numerous small white, 4-5 cleft, pedicelled, calyx obsoletely 4-5 toothed, those of the fruit repandly denticulate, stamens 4-5, drupe roundish smooth yellow size of a large pea. *Ræm. and Sch. Syst.* 4, *p.* 798. Cordia angustifolia, *Roxb. Fl. Ind.* i. 595. *(*not *Ræm. and Sch.)* C. cuneata, *Heyne*;—*Wight Icones tab.* 1379.

Common about our western forests and in Mysore, &c.

7. Cordia Perottetii, *DC.*—A small tree, branches terete, the younger ones, petioles and peduncles velutino-scabrous rufescent, leaves petioled elliptic obtuse at both ends entire, scabrous above somewhat velvetty beneath, up to 3 inches long by 1½ broad, petiole 4-5 lines long. Cymes shorter than the leaves sub-racemose, calyx oblong obtuse irregularly toothed tomentose, corol-tube equalling the calyx 4-cleft, lobes oblong reflexed. *DC. Prod.* ix. 482;—*Wight Icones tab.* 1381.

Not uncommon in our western forests, Bellary, Cuddapah and South Arcot.

8. Cordia fulvosa, *Wight.*—A small tree, branches glabrous terete, young shoots, leaves, &c., fulvo-pubescent, leaves ovate obtuse at both ends sometimes suborbicular, entire or repand toothed, smooth dull or somewhat hoary with very short fulvous pubescence, 1½-2 inches long by 1-1¼ bread, petioles about 6 lines long, flowers congested at the apex of the branches of the cymes, in bud obovate and villous at the apex, calyx subcampanulate irregularly 4-6 toothed, corol deeply 4-6 cleft, lobes obovate emarginate glabrous, tube hairy, stamens 4-6, filaments glabrous inserted at the mouth of the tube. *Wight Icones. tab.* 1380.

Forests on the west side of the Presidency.

9. Cordia diversa, *Thw.*—A small tree, young branches tomentose, leaves ovate a little acuminate rounded at the base, 3-nerved scabrous above, beneath fusco-tomentose, 2-4 inches long by 1-2½ broad, petioles ½-1 inch long, panicles few-flowered tomentose, calyx obconical 3 lines long 3-4 toothed tomentose on the outside particularly at the apex, glabrous within, corol glabrous a little longer than the calyx 5-lobed, drupe round ½ an inch in diameter. *Thw. En. Pl. Zey. p.* 214.

Ceylon, hot drier parts of the island.

10. Cordia oblongifolia, *Thw.*—A small tree subscandent, branches terete glabrous, leaves glabrous oblong shortly acuminate very minutely reticulato-venose, subacute at the base, 2-5 inches long by 1-2½ inch broad, petioles 1 inch long, panicle sparingly pilose, calyx cylindrical 3-5 toothed internally villous, 4 lines long, corol 5-7 lobed, lobes oblong reflexed, the tube equalling the calyx, fruit nearly an inch in diameter rounded acuminate. *Thw. En. Pl. Zey. p.* 214.

Ceylon, Central Provinces up to 2000 feet.

Cordia speciosa, *Willd.* (C. Sebestena, *L.*) and Cordia tectonifolia, *Wall.*; small trees with handsome scarlet flowers in our gardens in the plains, are introductions from the West Indies; and Cordia subcordata, *Lam.* (C. campanulata, *Roxb.*), has also been introduced into this Presidency from the Moluccas.

EHRETIA. Linn.

For Gen. Char. see letter-press to Pl. ccxlvi.

1. Ehretia lævis, *Roxb.*—For description, &c. see Pl. ccxlvi.

2. Ehretia aspera, *Roxb.*—A small bushy tree, young shoots downy, leaves alternate ovate scabrous above, downy beneath, 2-3 inches long by 1-2 broad, petioles channelled about 1 inch long, corymbs terminal dichotomous dense with the

branches recurved and 2-forked, flowers very small white, calyx-segments ovate downy outside, corol-tube gibbous, fruit size of a pepper-corn red marked with 4 angular elevations, corresponding with the angles of the 4-celled smooth nut. *Roxb. Fl. Ind.* i. 598.

Common throughout the Presidency in dry barren places.

3. EHRETIA OVALIFOLIA, *Wight.*—A small tree or only a large shrub, subglabrous, leaves oval to somewhat obovate, obtuse or with a short blunt acumen, smooth on both sides with hollow hairy glands in the axils of the veins beneath or sometimes more or less hairy on the underside, 1½-2 inches long by about 1 inch broad, petioles 6 lines long, cymes terminal or axillary dichotomously branched circinate, flowers secund short-pedicelled, calyx deeply 5-cleft slightly hairy, corol rotate, lobes reflexed, stamens exserted, drupe red size of a small pea. *Wight Icones tab.* 1383.

Common in the Coimbatore, Madura and Tinnevelly districts up to 2000 feet elevation, allied to aspera but with the leaves generally quite glabrous.

4. EHRETIA WIGHTIANA, *Wall.*—A large shrub or small tree glabrous, ramuli slender smooth, leaves elliptico-lanceolate subacuminate, tapering at the base into the slender petiole, entire glabrous on both sides, 1½-2¼ inches long by 6-8 lines broad, petioles 6-8 lines long, cymes terminal compact dichotomous, branches revolute, flowers secund subsessile, calyx 5-toothed about 1 line long, corol-tube funnel shaped 2½ lines long, stamens exserted, drupe size of a large pepper-corn. *Wight Icones tab.* 1384.

Tinnevelly ghats, up to 2000 feet, common.

5. EHRETIA BUXIFOLIA, *Roxb.*—A large ramous shrub or very small tree, leaves on the young branches alternate, on the older ones fascicled, sessile, wedge-shaped, apex tridentate very hard scabrous and shining, ½-1 inch long by ¼-½ inch broad; cymes axillary 2-6 flowered, pedicels very short, flowers small white, calyx 5-parted, segments lanceolate as long as the corol, corol campanulate, lobes 5-6, stamens 5-6 shorter than the corol, berry size of a pea succulent red, nut 5-6 celled. *Roxb. Fl. Ind.* i. 598.

Common throughout the Presidency, generally in dry barren places.

EHRETIA SERRATA, *Roxb.*—Found in some gardens, is an introduction from Northern Bengal.

ORDER LVII—SALVADOREÆ.

Calyx inferior 4-parted minute valvate, corolla membranaceous monopetalous 4-parted, lobes imbricate. Stamens 4 connecting the petals in a monopetalous corolla. Anthers round 2-celled bursting longitudinally. Ovary superior 1-celled with a single sessile stigma, ovule solitary erect. Fruit a berry 1-celled indehiscent, seed solitary erect, embryo amygdaloid without albumen. Cotyledons fleshy plano-convex fixed a little below their middle to a long axis, the radicle of which is enclosed within their bases. Small trees, leaves opposite leathery entire very obscurely veined; flowers minute in loose panicles.

This order only consists of a single genus which yields 1 *small tree within our limits.*

SALVADORA. LINN.

For Gen. Char. see Pl. ccxlvii.

1. SALVADORA WIGHTIANA, *Planch.*—For description, &c. see Pl. ccxlvii.

ORDER LVIII—BIGNONIACEÆ.

Flowers irregular. Calyx tubular or campanulate, truncate toothed or laterally split. Corolla-tube elongated or rarely short and campanulate; lobes 5, spreading, often arranged in 2 lips, variously imbricate or rarely induplicate-valvate in the bud. Stamens 2 or 4, in pairs or rarely 5 inserted in the tube, the fifth generally only a staminodium usually small rarely wanting. Anthers 2-celled the cells opening longitudinally. Ovary usually 2-celled, with 2 distinct placentas in each cell attached to the dissepiments, and either contiguous or separated by a considerable interval, or, in some genera, the dissepiment discontinued between the placentas, and the ovary then 1-celled or very rarely sub 4-celled, ovules several, often numerous to each placenta. Style filiform, with 2 short stigmatic lobes. Fruit a capsule, often elongated, opening loculicidally or septifragally in 2 valves, leaving the dissepiment free, or indehiscent, (in the tribe Crescentieæ.) Seeds transverse, usually flattened and bordered by a membranous wing, wingless (in Crescentieæ) without albumen. Embryo straight or rarely curved; cotyledons flat or fleshy; radicle next the hilum. Trees, shrubs or woody climbers (very rarely herbs.) Leaves opposite or rarely scattered, compound or rarely simple, without stipules. Flowers solitary in the axils or more frequently paniculate.

Tribe I. Bignonieæ.—Capsule dehiscing septifragally, the dissepiment being parallel.

Stamens 5, the 5th often sterile, anthers spurless	BIGNONIA.
Stamens 4, anthers spurred	MILLINGTONIA.

Tribe II. Catalpeæ.—Capsule dehiscing loculicidally, the dissepiment being transverse (i. e., attached before maturity to the centre of the valves.)

Calyx spathaceous	SPATHODEA.
Calyx not spathaceous.	
Capsule sub 4-celled	HETEROPHRAGMA.
Capsule 2 celled.	
Capsule 4 cornered or cylindric, the dissepiment cellular thick and corky, seed bony	STEREOSPERMUM.
Capsule flat and winged	PAJANELIA.

This order is represented by about 11 *indigenous trees; the genus Bignonia gives* 2, *both common throughout the Presidency, one yielding a fair timber, the other worthless. Millingtonia* 1 *species, well known in a planted state as the cork tree. Spathodea* 3 *or* 4, *widely distributed over the Presidency, all good timbers. Heterophragma* 1, *a rare tree, timber good. Stereospermum* 2, *common throughout the Presidency, most useful timbers. Pajanelia* 1, *a most ornamental tree, confined to the west coast. Of introduced plants we have one very fine Spathodea from Birmah, a large tree common in our gardens. Kigelia pinnata, a large tree from Eastern Africa. Two species of Crescentia, American trees, and our gardens in the plains are gay with beautiful climbing species of Bignonia and Tecoma, chiefly introductions from tropical America.*

BIGNONIA. L.

For Gen. Char. see letter-press to Pl. lxx. (The genus Calosanthes, *Blume,* with the 5th stamen fertile, is now included in this genus.)

1. BIGNONIA XYLOCARPA, *Roxb.*—For description, &c. see Pl. lxx.

2. BIGNONIA INDICA, *Linn.*—A tree, glabrous, bark smooth, leaves opposite bi-pinnate 4-6 feet long, leaflets short petioled obliquely-cordate to subcordato-ovate, acuminate entire, 3-6 inches long by 2-4 broad, racemes terminal erect secund rigid the lower ⅔ naked scabrous and somewhat quadrangular, flowers large (3½ inches long) fleshy dark dull reddish, fetid ; calyx coriaceous tubular truncated about 1 inch long, corolla with a short tube, limb 5-lobed sub 2-lipped somewhat fimbriately cut. Stamens 5 all fertile 2 somewhat longer than the others, filaments woolly at the base, anther-cells divaricate pendulous, disk fleshy somewhat 5-gonal, stigma bilamellate, capsule flat, siliqueform 2 feet long by 3 inches broad compressed somewhat curved with the convexity upwards, seed-wing delicate membranaceous. *Linn. Roxb. Fl. Ind.* iii. *p.* 110. Calosanthes Indica, *Blume* ;— *Wight Icones tab.* 1337-8. Bignonia pentandra, *Lour.*

Not uncommon in forests throughout the Presidency and Ceylon up to 3000 feet elevation, and sometimes cultivated in native gardens ; it is also found in Bengal, Java and Cochin China ; the timber is soft and useless, the tree is called Pana in Tamil, Pampana in Teligu, and Totilla in Ceylon ; the bark and capsules are astringent and are used in tanning and medicinally amongst the natives. Roxburgh says that it is a lofty tree on the eastern coast mountains, but as far as I have observed it is always a small tree on the west side of the Presidency.

MILLINGTONIA. LINN. F.

For Gen. Char. see letter-press to Pl. ccxlix.

1. MILLINGTONIA HORTENSIS, *Linn. f.*—For description, &c. see Pl. ccxlix.

SPATHODEA. BEAUV.

For Gen. Char. see letter-press to Pl. lxxi.

1. SPATHODEA FALCATA, *Wall.*—For description, &c. see Pl. lxxi.

2. SPATHODEA RHEEDII, *Wall.*—A good sized handsome tree, leaves unequally pinnate 12-15 inch long, leaflets 2-3 pair with an odd one membranaceous glabrous but rather rough with minute scale-like speeks, oval-lanceolate to almost rhomboid very oblique and unequal-sided at the base, acuminate at the apex, entire or with a few large coarse serratures here and there on the margins, 3-4 inches long by 2-2½ inches broad, petiolules 4-5 lines long, racemes terminal much shorter than the leaves about 3-flowered, calyx sub-glabrous 1½ inches long, corol white funnel-shaped about 6 inches long, tube long slender gradually widening near the apex, lobes somewhat curled and crenulate at the margins, stigma 2-lipped the lobes flat acute, capsule siliqueform subcylindric generally more or less curved about 8 inches long, septum thickened in the middle, seed-wing thickish opaque truncated. *Wall. DC. Prod.* ix. *p.* 206 ;—*Wight Icones. tab.* 1339.

Common about Tellicherry, and elsewhere in the plains of Malabar, and in Ceylon, also found in the Eastern Archipelago (Timor), very showy when in blossom.

3. SPATHODEA CRISPA, *Wall.*—A handsome tree of considerable size, young parts pubescent, leaves unequally pinnate 6-10 inches long, leaflets 1-3 pair with an odd one submembranaceous glabrous ovate to oblong entire or somewhat repand generally with a very unequal base, furnished with a long acumination at the apex, 3-4 inches long by 1½-2 broad, opposite petiolules 9-10 lines, the terminal one often 2 inches long, racemes terminal 3-7 flowered, pedicels 8-9 lines long, calyx 9-10 lines long puberulous, corol hypocrateriform white fragrant 2-2¼ inches long, the tube slender, the lobes much curled and crisped, capsule 12-15 inches long ½ an inch in diameter obtusely acuminated brown and slightly scabrous, septum thick and spongy. *Roxb. Fl. Ind.* iii. 104.

Not uncommon in subalpine forests throughout the Presidency, in Cuddapah and North Arcot it is well known by its Tamil name Poombadri. The leaves are very often trifoliate, the beautiful white flowers only open towards the evening and fall off early the next morning ; the timber is much esteemed by the natives, it is very similar to that of Stereospermum suaveolens, and is in use for building and many other purposes.

4. SPATHODEA ARCUATA, *Wight.*—A tree, leaves unequally pinnate, leaflets 4-5 pairs, from ovate subacute to orbicular unequal at the base entire, softly pubescent when young afterwards glabrous, 2½ inches long by 1¼ broad, petiolules 2 lines long, racemes terminal elongated many flowered, calyx cylindrical oblique pubescent on the outside, about 1 inch long, corolla-tube slender 2-2½ inches long, lobes fimbriate at the margins, capsule arcuate compressed 8-12 inches long by about 1 inch broad. *Wight Icones tab.* 1340.

Palghat and Coimbatore jungles, the flowers expand in the evening and drop in the morning. I have no specimens of this tree and suspect it is only a variety of S. cripsa ; of that species I have numerous specimens, but they have all of them long petiolules (9-10 lines), and never more than 5 leaflets.

5. SPATHODEA ADENOPHYLLA is very common in our gardens in the plains, but is an introduction from Birmah.

HETEROPHRAGMA. DC.

Gen. Char. Calyx campanulate 3-cleft, corol tube broad, lobes 5 spreading obtuse waved, stamens 4 fertile with a 5th sterile, anther cells subdivaricate glabrous, disk glandular encircling the base of the ovary, style filiform, stigma 2-cleft, lobes subulate, capsule rigid oblong acuminate 2-valved sub 4-celled, the septum enlarged in the middle on each side with a sharp ridge which touches the sides of the valve nearly dividing the 2 cells into 4, seeds broadly winged. A large tree, leaves opposite or verticelled in threes, glabrous, simply pinnate with 4-5 pairs of leaflets, panicle terminal.

1. HETEROPHRAGMA ROXBURGHII, *DC.*—A large tree with a tall straight trunk, bark grey with a few scabrous spots, branches numerous spreading, leaves about the ends of the branches unequally pinnate 1-2 feet long, leaflets 4-5 opposite pairs ovate to oblong acute serrate glabrous, panicle erect dense many-flowered downy, bracts scarcely any, flowers large rosy very fragrant, calyx downy, capsule erect straight linear pointed pretty smooth 12 inches long by 2 broad.—Bignonia quadrilocularis, *Roxb. Fl. Ind.* iii. 107.

I met with this tree abundant in the Godaveri jungles many years ago, and it occurs on the Bombay ghats, and probably in our western forests, but I have never met with it in the latter, and have no specimens at hand ; it is called Warus in the Bombay Presidency ; it flowers in March and April ; the wood is strong and in use for various purposes.

STEREOSPERMUM. CHAM.

For Gen. Char. see letter-press to Pl. lxxii.

1. STEREOSPERMUM CHELONOIDES, *Willd.*—For description, &c. see Pl. lxxii.

2. STEREOSPERMUM SUAVEOLENS, *Roxb.*—A good sized tree, bark ash-colored and rather scabrous, leaves opposite unequally pinnate 1-2 feet long, leaflets 2-4 opposite pair oval to ovate with a narrow bluntish acumen, entire or slightly serrate, downy on both sides when young, glabrous but harsh in age, the upper pair and the odd leaflet 6 inches long by 3-4 inches broad, the lower ones smaller, petiolules swelled at the base roundish 4-5 lines long, panicles terminal compound downy and rather viscid, flowers dark dull-crimson very fragrant, about 1½ inches long, calyx rather villous on the outside, corol woolly in the throat. Capsule very long siliqueform cylindrical.—Bignonia suaveolens, *Roxb. Fl. Ind.* iii. *p.* 104.

A very common tree throughout the Presidency and in Bengal; it is known by the same Tamil and Telugu names as S. chelonoides, and is called Hooday and Billa in Canarese ; the wood is much esteemed and much in use, it is very similar to that of chelonoides, only a little redder. The tree is called Purul on the Bombay ghats ; the roots are valued in Ceylon as a tonic ; the tree is often planted about native gardens and temples.

PAJANELIA. DC.

Gen. Char. Calyx coriaceous oblong pentagonal 5-cleft, teeth acute or bifid ; corol coriaceous, tube short broad, throat wide campanulate, lobes 5 rounded ; stamens 4 fertile a 5th sterile scarcely shorter than the others, anther-cells divaricate reflexed ; stigma 2-lobed clavate ; capsule flat with a broad wing on both sides, partition contrary to the valves, seeds roundish flat thinly winged except at the base. A tree, leaves opposite unequally pinnate, panicles thyrsiform erect many-flowered, flowers large purplish. *DC. Prod.* ix. 227.

1. PAJANELIA RHEEDII, *Wight.*—A small weak tree, leaves 2-5 feet long, common petiole angled, leaflets many pair opposite subglabrous but harsh in age, obliquely falcato-ovate or oblongo-ovate with a long fine acumination, very unequal sided and very oblique at the base, 4-8 inches long by 1¾ to 3¼ broad, the primary veins (10-12 on one side and 6-8 on the other) and the reticulated veinlets and venules very prominent beneath, petiolules 2 lines long, flowers 3½-4 inches long, calyx puberulous, corol-tube contracted below the middle glabrous on the outside, lobes much crisped on the outer margin and furnished on the inner edges with a line of dense woolly hair, and slightly hairy on the outside. Capsule 12-15 inches long cuspidate. *Wight Icones tab.* 1343-4.

Common on the Malabar ghats up to 2000 feet, and about fields and waste places in the plains of that district ; it is always a small weak tree and of no value except for ornament, but for its superb foliage or for its flower it is a most desirable plant for parks or gardens.

Anomalous genus allied to Bignoniaceæ in its fruit, and to Jasmineæ in its flower.

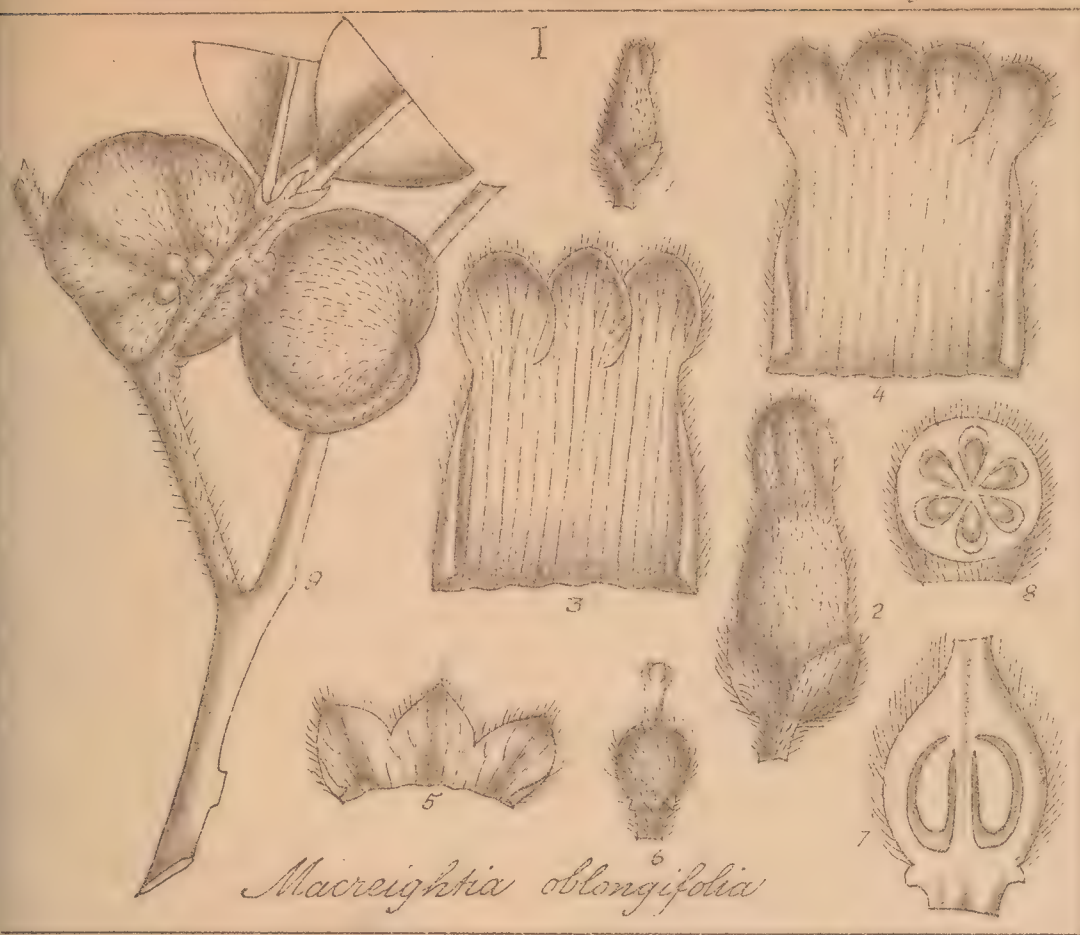
SCHREBERA. ROXB.

For Gen. Char. see letter-press to Pl. ccxlviii.

1. SCHREBERA SWIETENIOIDES, *Roxb.*—For description, &c., see Pl. ccxlviii.

Ebenaceæ Combretaceæ Loganiaceæ Bignoniaceæ Verbenaceæ

I

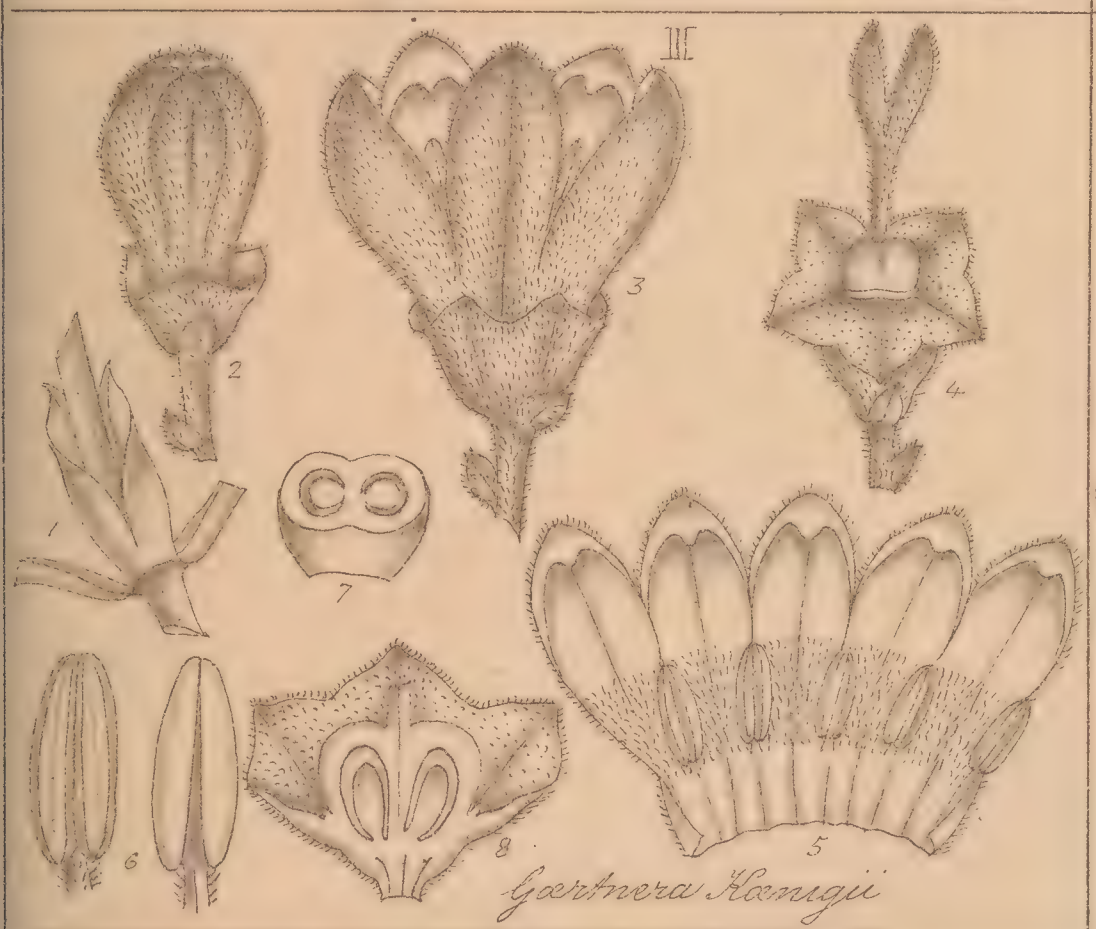


Macreightia oblongifolia

II

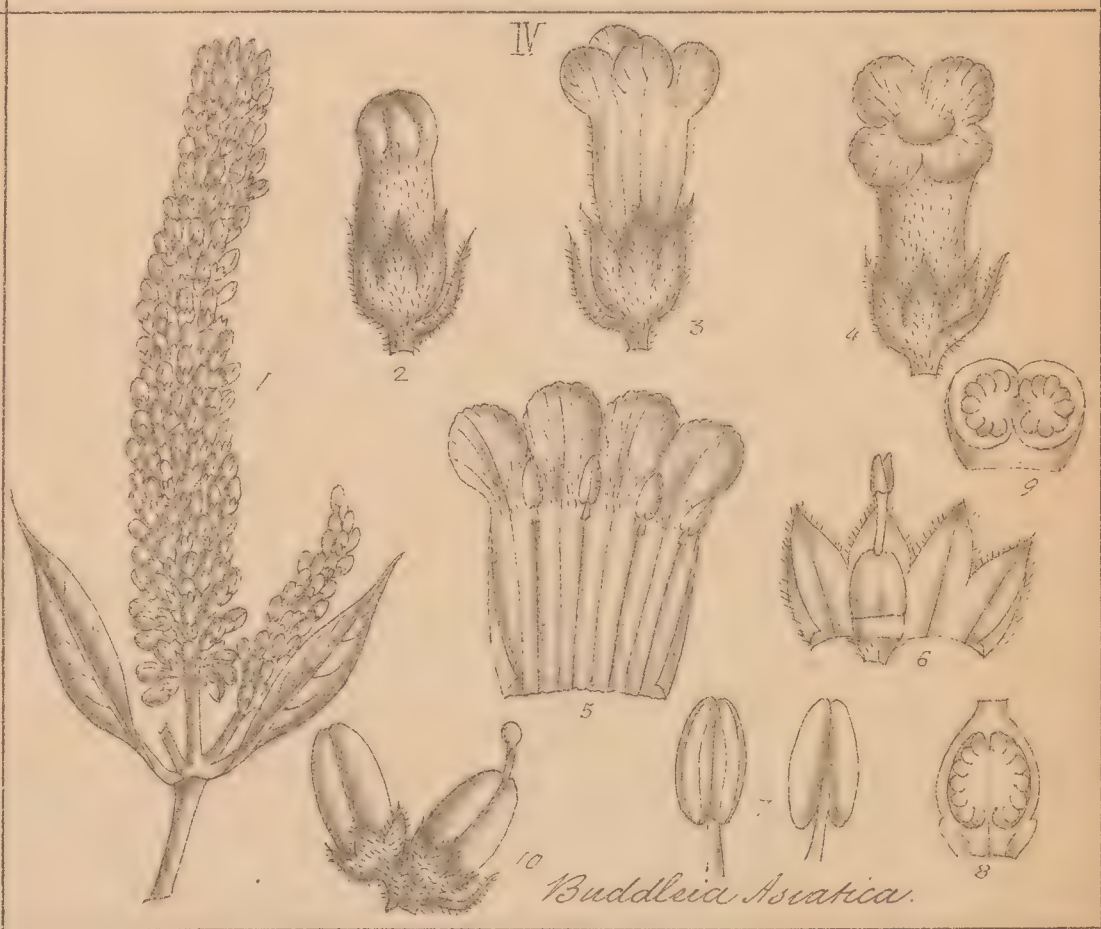
Lumnitzera racemosa

III



Gaertnera Kanaii

IV

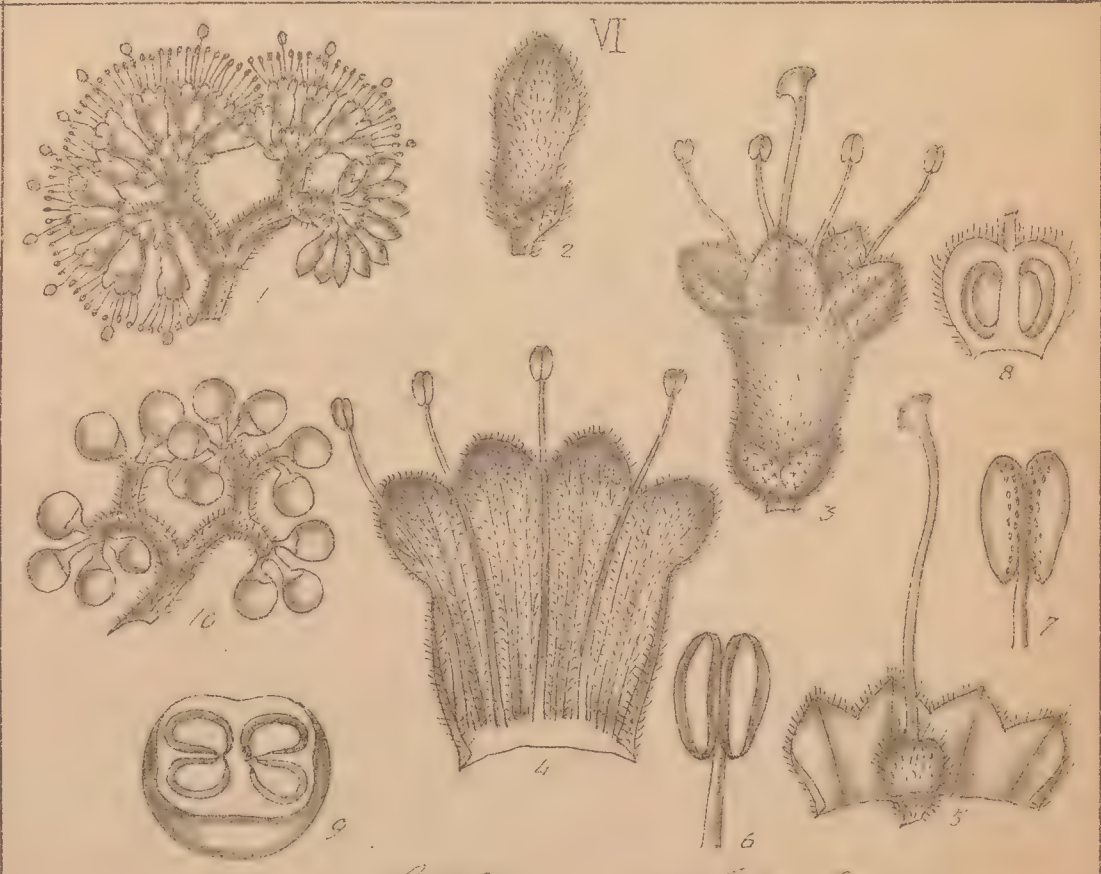


Buddleia Asiatica

V

Pajanelia Rheedii

VI



Galliarduia Wallichiana

Dunphy, Lith.

Passiflora Nyctaginea Euphorbiacea

ORDER LIX—VERBENACEÆ.

Flowers irregular or rarely regular. Calyx persistent, truncate toothed or lobed. Corolla with 4 or 5, rarely 6 to 8 lobes, or rarely truncate the lobes more or less 2-lipped or nearly or quite equal, imbricate in the bud, the upper lip or uppermost lobe or sometimes the lateral ones outside. Stamens inserted in the tube of the corolla, usually 4 in pairs or nearly equal and alternating with its lower lobes, or when the corolla is regular 4-8 alternating with its lobes. Anthers 2-celled, the cells opening longitudinally and usually parallel. Ovary not lobed or only shortly 4-lobed, usually more or less perfectly divided into 2 or 4 cells or half-cells, with 1 ovule in each cell or half-cell, either anatropous and erect from the base, or more or less amphitropous and attached laterally or near the top so as to appear pendulous. Style terminal, simple entire or more frequently with 2 short stigmatic lobes. Fruit dry or more or less drupaceous, the whole fruit or the endocarp separating into 2 or 4 nuts or pyrenes or quite indehiscent and 2 or 4-celled, and sometimes with an additional central cavity between the carpels having the appearance of a third or fifth empty cell. Seeds solitary in each cell, half-cell or pyrene, erect with or without albumen, the testa usually membranous. Embryo straight, with thick cotyledons and an inferior radicle. Herbs, shrubs, trees or woody climbers. Leaves opposite whorled or rarely alternate, without stipules, entire toothed or divided. Inflorescence various.

Fruit or drupe.
- Lower lobe of the corol much longer than the 4 other, tube short.
  - Flowers small, leaves compound ... ... VITEX.
  - Flowers showy, leaves simple... ... ... GMELINA.
- Corol lobes nearly equal.
  - Corol small usually 4-lobed.
    - Cymes or panicles terminal, style acutely 2-lobed ... ... PREMNA.
    - Cymes axillary, style dilated and truncate at the top ... ... CALLICARPA.
  - Corol 5-6 lobed.
    - Corol tube slender, stamens 4 ... ... CLERODENDRON.
    - Corol tube short, stamens 5-6 ... ... TECTONA,

Fruit a 2-valved capsule ... ... AVICENNIA.

This Order yields the Teak tree, TECTONA GRANDIS, *and* 3 *other valuable timber trees,* VITEX ALTISSIMA *and* PUBESCENS *and* GMELINA ARBOREA. *Of less important trees it gives us another Vitex,* (V. LEUCOXYLON), *three Premnas* (P. TOMENTOSA, SERRATIFOLIA *and* LATIFOLIA), *and one Callicarpa* (C. LANATA), *making a total of* 9 *trees. Of shrubs it yields* 10, *viz.* 2 *species of Vitex,* 1 *of Gmelina,* 3 *of Premna,* 3 *of Clerodendron, and* 1 *of Avicennia. Of scandent plants, undershrubs or herbs not coming under the scope of this Flora there are* 3 *Clerodendrons,* 1 *Congea,* 1 *Symphorema,* 2 *Boucheas,* 1 *Lantana,* 1 *Lippia,* 3 *Premnas and* 1 *Priva.*

VITEX. LINN.

For Gen. Char. see letter-press to Plate cclii.

1. VITEX ALTISSIMA, *L.*—For description, &c. see Pl. cclii.

2. VITEX PUBESCENS, *Vahl.*—A large tree, young branches 4-sided, channelled, and with the petioles and young leaves pubescent or slightly tomentose, leaves 3-5 foliate, petioles 2-4 inches long, leaflets 4-9 inches long by 2½-3 inches broad, elliptic or ovate oblong attenuato-acuminate, rounded at the base subsessile coriaceous penniveined glabrous, shining above, pale finely puberulous beneath, panicles finely villous terminal compound ovato-pyramidal compact, cymes interspersed with foliaceous bracts longer than the calyx, calyx cyathiform sinuately 5-toothed 2½ lines long, corol twice the length of the calyx inflated, inferior lip straightish villous at the base, branches oblong acuminate, drupe globose size of a pea. *DC. Prod.* xi. 685 ;—*Wight Icones.* 1465. Vitex arborea, *Roxb. Fl. Ind.* iii. *p.* 73.

This tree is found throughout our western forests and on our eastern mountains, but it is very much rarer than V. altissima ; it is not uncommon about the foot of the Travancore ghats and on the Tinnevelly mountains at no great elevation ; it also inhabits Eastern Bengal, Birmah, Penang, Sumatra and Java. The timber is of a chocolate color, very hard and durable, and is in use for various purposes ; the tree is called Nowli eragu (Telugu) in the Northern Circars.

3. VITEX LEUCOXYLON, *Linn. fil.*—A large tree, bark soft spongy, young shoots round and smooth often pruinose, leaves opposite on petioles 2-5 inches long, 3-5 foliate, leaflets on petiolules ½ to 1 inch long, oblong or lanceolate generally entire ; sub-coriaceous glabrous and shining above, pale and glabrous or finely puberulous beneath, penniveined, 2-6 inches long by 1-3 inches broad, cymes axillary long peduncled corymbose divaricato-dichotomous, many-flowered, flowers fragrant of a whitish color with the centre of the lower lip violet, calyx patelliform 5-toothed, corol twice the length of the calyx, inferior lip spreading densely hairy, bracts very minute caducous drupe oval smooth shining black, pulp soft black, nut oblong compressed somewhat furrowed. *Linn. fil. Supp.* i. 293 ; —*Roxb. Fl. Ind.* iii. *p.* 74. Wallrothia leucoxylon, *Roth.* Vitex bombacifolia, *Wall.* Vitex saligna, *Roxb. Fl. Ind.* iii. 75.

This tree is sparingly distributed throughout the presidency and Bombay, generally on the banks of streams or rivers ; it is also found in Ceylon, Eastern Bengal and Birmah. In South Canara and part of the Mysore country it is called Hola-nakee (Canarese) ; it ascends the mountains to a little above 3000 feet. The wood is whitish and compact and deserves attention for furniture, and is in use for cart-wheels and various other purposes with the natives ; a cubic foot weighs 42 lbs.

4. VITEX NEGUNDO, *Linn.*—A large erect shrub or small tree with a trunk about 3 feet in girth, the branches, underside of the leaves and inflorescence mealy white, leaves opposite 3-5 foliate, leaflets entire or toothed lanceolate or oblong glabrous or nearly so above, the central one 2-4 inches long, the 2 lower ones smaller and sessile ; flowers small in close opposite cymes forming simple or branched spike-like panicles or rarely the cymes become loosely dichotomous, flowers from white with only a tinge of pink to bluish purple, calyx tomentose not above 1 line long, corol much longer, usually tomentose outside and hairy at the base of the lower lobe. *Linn. Sp. p.* 890 ;—*DC. Prod.* xi. 683 ;—*Wight Icones tab.* 519. V. bicolor, *DC. l. c. p.* 683. V. incisa, *DC. l. c. p.* 684.

This shrub or small tree is common throughout the presidency and Ceylon, generally on the banks of rivers, up to 3000 feet elevation ; it is also found in Bengal, Birmah, the Mauritius, Manilla, Japan, Australia and Hong Kong. It is called Nisinda and Nengar in Hindostanee, and Veyala in Telugu ; the root is bitter and used as a febrifuge, and the leaves bruised are applied to the temples to cure headache.

5. VITEX TRIFOLIA, *Linn.*—A shrub or small tree, the branches, underside of the leaves, and inflorescence mealy-white, leaves 3-5 (rarely 1-) foliate, leaflets sessile or stalked ovate oblong or obovate entire, 1-1½ inches long glabrous or nearly so on the upper side, flowers nearly white or pale blue in small nearly sessile opposite cymes forming short terminal panicles either simple and spike-like or slightly branched, the floral leaves reduced to short bracts. Calyx about 2 lines long very shortly 5-toothed ; corol-tube nearly twice as long as the calyx, the 4 upper lobes short the lowest twice as large and often as long as the tube, and both calyx and corol more or less mealy outside, ovary 2-celled with 2 ovules in each cell, drupe globular smooth black size of a pea. *Linn. Suppl.* 293 ;—*Roxb. Fl. Ind.* iii. *p.* 69.

This is common (chiefly maritime) throughout India and Ceylon, also in Birmah, the Mauritius, Sumatra, Timor, China, Japan, and Australia. The leaves are a powerful discutient ; it has the same native names as the last species.

GMELINA. LINN.

For Gen. Char. see letter-press to Pl. cclii.

1. GMELINA ARBOREA, *Roxb.*—For description, &c. see Pl. cclii.

2. GMELINA ASIATICA, *Linn.*—A large shrub, thorny or unarmed, thorns when present axillary opposite horizontal leaf-bearing, leaves petioled broad-oval or obcordate often irregularly lobed, glabrous and shining on both sides or glaucous beneath, 1-1½ inches long by about 1 inch broad, racemes axillary and terminal tomentose, flowers large (1½ inches long) yellow drooping, bracts foliaceous lanceolate cuspidate concave caducous, calyx shortly 4-toothed furnished with discoid glands in front, corol with the lower lip larger than the others, drupe about the size of a filbert. *Linn. Sp. p.* 873 ;*DC.—Prod.* xi. 679 ;—*Roxb. Fl. Ind.* iii. 87. G. parvifolia, *Roxb. Fl. Ind.* iii. 87.

A common shrub throughout India and Ceylon up to 3000 feet elevation, also found in the Philippines ; it is only used as fuel ; it is called Gumudu in Telugu and Gattademmata in Ceylon.

PREMNA. LINN.

For Gen. Char. see letter-press to Pl. ccli.

1. PREMNA TOMENTOSA, *Willd.*—For description, &c. see Pl. ccli.

2. PREMNA SERRATIFOLIA, *Linn.*—A small tree, the trunk and older branches armed with opposite spines, branchlets panicles and petioles pubescent or glabrous, leaves short petioled ovate or oval-oblong, 2-4 inches long obtuse or acuminate, rounded towards the base, entire or with a few coarse obtuse teeth, quite glabrous in age, flowers small greenish yellow in dense terminal trichotomous cymes or corymbose panicles, slightly viscid and emitting a heavy disagreeable smell, calyx truncate or somewhat bilabiate, tube of the corol twice as long as the calyx, stamens slightly exserted. *Linn. Mant.* ii. *p.* 253. P. integrifolia, *Linn. l. c.* ; *DC. Prod.* xi. 632 ; *Wight Icones tab.* 1469.

Common throughout the plains of India, generally near the coast, also in Ceylon and Malacca ; wood used as firewood and for various purposes by the natives ; called Middee in Ceylon ; the root is used medicinally.

3. PREMNA LATIFOLIA, *Roxb.*—A small tree, leaves subcoriaceous round-cordate or oval entire or obsoletely repand obtuse or slightly acute, a little downy or glabrous in age except the veins, pale beneath, generally about 2½ inches each way, petioles round ½ to 1 inch long, panicles corymbose axillary and terminal many-flowered, flowers dirty-yellow, bracts minute caducous, calyx campanulate unequally 5-toothed, corol throat wooly, upper lip 3-cleft the under one emarginate, anthers bluish scarcely exserted, drupe size of a pea. *Roxb. Fl. Ind.* iii. 76 ;—*DC. Prod.* xi. *p.* 635.

Not uncommon throughout the peninsula and in Ceylon, generally near the coast ; called in Telugu Pedda nella kura, and in Ceylon Middee : it is perhaps only a variety of the last species. The wood is white and firm and used for various purposes ; the leaves, which have a strong but not disagreeable smell, are much used in curries by the natives.

4. PREMNA CORDIFOLIA, *Roxb.*—A shrub about 6 feet high, branchlets cymes and petioles of the younger leaves villous, leaves short petioled cordate or cordato-ovate acuminate entire bullate, glabrous on both sides, shining above dull and pale beneath, 3-6 inches long, panicles terminal small contracted corymbose, flowers greenish-yellow, calyx cup-shaped 2-lipped both lips roundish entire, corol bilabiate about the length of the calyx-tube, upper lip rounded entire concave, lower 3-lobed, the middle lobe larger, throat densely villous, stamens and style about as long as the corol, drupe the size of a pea. *Roxb. Fl. Ind.* iii. 78 ;—*Wight Icones tab.* 1483.

Coimbatore, Madura, S. Arcot, and elsewhere in the plains of the peninsula.

5. PREMNA GLABERRIMA, *Wight.*—A shrub 5-6 feet high, everywhere glabrous except the inflorescence, leaves petioled ovate oblong or obovate abruptly acuminate entire or toothed membranaceous or subcoriaceous, somewhat shining above, pale whitish beneath, up to 8 inches long by 2½ broad, panicles terminal lax corymbose, ultimate divisions dichotomously cymose, calyx campanulate

obscurely 5-toothed shortly villous, corol bilabiate, upper lip emarginate, under 3-lobed, middle lobe the largest, throat hairy, stamens didynamous the larger pair exserted, style length of the longer stamens subclavate 2-cleft at the apex. *Wight Icones tab.* 1484.

Tinnevelly mountains ; the leaves are often serrated.

6. PREMNA WIGHTIANA, *Schauer.*—A large shrub or small tree, branchlets, cymes and petioles pubescent, leaves petioled ovate abruptly acuminate rounded or slightly attenuated at the base, entire or shortly toothed anteriorly, sub-bullate, glabrous on both sides membranaceous, about 3 inches long, panicles terminal thyrsoid, calyx sub-bilabiate unequally 5-toothed, tube of the bilabiate corol twice the length of the calyx, throat closed with hairs, putamen of the drupe pear-shaped verrucoso-tuberculate. *DC. Prod.* xi. 635 ;—*Wight Icones tab.* 1485.

Common about the southern parts of the peninsula up to about 3000 feet elevation.

7. PREMNA PURPURASCENS, *Thw.*—A scandent species (Anamallays, Wynaad, Ceylon.)—8. PREMNA HERBACEA, a small medicinal herb (Mudumallay, Travancore (Cardamom Hills), Ceylon).—9. PREMNA PROCUMBENS, an undershrub (Ceylon).

CALLICARPA. LINN.

Gen. Char. Calyx truncate or 4-rarely 5-toothed. Corolla with a short tube, the limb spreading, of 4, rarely 5 lobes, nearly equal. Stamens 4, rarely 5, shortly exserted. Ovary 4-celled with 1 ovule in each cell, laterally attached at or above the middle ; style filiform, dilated and truncate or very shortly 2-lobed. Fruit a small succulent drupe, the endocarp of 4 distinct 1-seeded nuts or pyrenes. Seed without albumen. Trees or shrubs, more or less cottony or woolly with stellate hairs or rarely glabrous, and often with numerous resinous glandular dots, especially on the under side of the leaves. Leaves opposite, undivided. Flowers small, in axillary cymes, with very small bracts.

1. CALLICARPA LANATA, *Linn.*—A middling sized tree, all the young parts more or less mealy, young shoots bluntly 4-sided or nearly terete, leaves opposite ovate oval or elliptic with a long acumination entire or slightly serrated, more or less downy underneath with a dense white tomentum above, sometimes nearly glabrous in age except the veins, 9-15 inches long by 4-6 broad, petioles 2-3 inches long, corymbs axillary erect 2-forked throughout, more or less covered with downy farina, bracts small purple or red, calyx truncate short quite entire or more or less 4-toothed, corol twice as long as the calyx. *Linn. Sp. Pl. ed. Willd.* i. 620 ;—*Roxb. Fl. Ind.* i. 391. Tomex tomentosa, *Fl. Zey.* 59. C. Wallichiana, *Walps. Rep.* iv. 125 ;—*DC. Prod.* xi. 641.

This tree is common in hill forests throughout the presidency and in Ceylon up to 4000 feet elevation ; its wood is white and spongy and of no use, The leaves are entire and slightly serrated on the same tree. We have, I believe, only one species though it differs much in the amount of the mealy pubescence and shape of the leaves ; one variety from the Orissa mountains (Russelcondah) has much less pubescence than the southern forms, and the leaves are quite elliptic, tapering equally at both ends (6-8 inches long, without the petiole, by 3-4 broad.)

Analysis, Pl. XXI, fig. 6.

(Under Walper's name Wallichiana, which should be corrected to C. lanata, *L.*)

1. A small portion of a corymb.
2. A flower bud.
3. A full flower.
4. A flower opened.
5. Calyx opened, ovary, style and stigma.
6. An anther, front view.
7. An anther, back view.
8. Ovary cut vertically.
9. Ovary cut transversely.
10. Portion of a corymb in fruit. (Drawn from dried specimens collected on the Pulney Hills ; the calyx is much more toothed than usual, it is generally truncate and quite entire).

CLERODENDRON. LINN.

Gen. Char. Calyx campanulate or inflated, 5-toothed or 5-lobed, generally enlarged and spreading under the fruit. Corolla-tube slender, often very long ; limb spreading, nearly equally 5-lobed. Stamens 4, exserted and often very long. Ovary 4-celled, with 1 ovule in each cell, laterally attached at or above the middle. Style filiform, with 2 short acute stigmatic lobes. Fruit a more or less succulent or almost dry drupe, the endocarp separating into 4 one-celled or rarely into 2 two-celled pyrenes. Trees or shrubs or rarely herbs or woody climbers. Leaves opposite or in whorls. Flowers in loose heads or cymes, usually forming terminal corymbose or thyrsoid panicles, or rarely axillary.

1. CLERODENDRON INFORTUNATUM, *L.*—A large shrub, branchlets quadrangular and like the branches of the panicles, petioles and nerves of the leaves whitish strigoso-tomentose, leaves long petioled roundish or ovato-cordate, or the upper ones ovate or even attenuated at the base not at all cordate, entire or shortly and sharply toothed, strigose on both sides ; panicles terminal spreading large naked, cymes laxly flowered, bracteoles caducous, flowers white, calyx strigoso-pubescent 5-nerved ventricose at the base squamato-glandulose 5-parted, segments lanceolate slenderly acuminate, corol strigoso-villous and glanduloso-punctate many times longer than the tube of the calyx, segments of the limb sub-unguiculate sub-recurved 3 times shorter than the tube, berries purple. *Linn. Fl. Zey. p.* 232 ;—*DC. Prod.* xv. 667 ;—*Wight Icones tab.* 1471.

A common shrub or undershrub found throughout India and Ceylon up to 5-6000 feet elevation, also in Birmah and Penang; in Ceylon it is called Gas-pinna.

Analysis, Pl. XXII, fig. 1.

1. Portion of the inflorescence.
2. A corol opened, shewing the insertion of the stamens.
3. Calyx opened, shewing ovary, style and stigma.
4. Anthers, front and back view.
5. Ovary cut vertically.
6. Ovary cut transversely.

2. CLERODENDRON PHLOMOIDES, *Linn.*—A shrub 6-10 feet in height, branchlets terete and like the petioles and peduncles whitish tomentose, leaves membranaceous opposite petioled ovate or ovato-rhomboid acuminate somewhat obtuse entire at both ends, irregularly and bluntly serrated in the middle, glabrous above puberulous beneath, panicles terminal large fastigiate leafy below, cymes trichotomous lax, bracteoles oblong, flowers white, calyx glabrous campanulato-ventricose half 5-cleft, segments subovate acute, tube of the corol subglandulose thrice the length of the calyx. *Linn. Suppl. p.* 292;—*DC. Prod.* xv. 663;—*Wight Icones tab.* 1473.

A common shrub all over the peninsula.

3. CLERODENDRON INERME, *Br.*—A glabrous shrub, or when young slightly pubescent, leaves stalked ovate obtuse or shortly acuminate entire, 1-3 inches long, preduncles axillary often nearly as long as the leaves, bearing 3 pedicellate flowers, calyx truncate not 2 lines long when in flower, above 3 when in fruit, corol-tube slender about 1 inch long, lobes about 4 lines, stamens much longer, drupe ovoid about twice as long as the calyx. *DC. Prod.* xi. 660.

A common shrub throughout India along the sea coasts, also in the Archipelago and the Islands of the Pacific; called in Ceylon Wall gooranda.

4. CLERODENDRON SERRATUM, *Spr.*; 5. C. SIPHONANTHUS, *R. Br.*, are undershrubs found in our forests; and 6. C. LINNÆI, *Thw.*, is a scandent species found in Ceylon.

TECTONA. LINN.

For Gen. Char. see letter-press to Pl. ccl.

1. TECTONA GRANDIS, *L.*—For description, &c. see Pl. ccl.

AVICENNIA. LINN.

Gen. Char. Calyx divided to the base into 5 distinct segments or sepals. Corolla-tube short and broad; limb of 4 nearly equal spreading lobes or the upper one rather larger. Stamens 4, inserted in the throat, with the anthers slightly protruding. Ovary 1-celled, with 4 ovules collaterally suspended from a central column, which has 4 angles between the ovules, imperfectly dividing the ovary into 4 cells. Fruit a compressed capsule, the pericarp opening in 2 valves. Seed solitary, erect, without integuments, (the integuments of the ovule not developed); embryo with 2 very large cotyledons folded longitudinally, a very hairy radicle, and a prominent plumula, which germinates before the fruit drops off as in *Rhizophora*, &c. Shrubs, leaves opposite, undivided. Flowers in small cymes in the upper axils or in terminal panicles. *Linn.*;—*Benth. Fl. Aust.* v. *p.* 69.

1. AVICENNIA OFFICINALIS, *Linn.*—An erect shrub, varying much in height, the branches, inflorescence and underside of the leaves white or silvery with a very close tomentum, more silky on the flowers, the upper side of the leaves usually glabrous when full grown, black and shining when dry. Leaves coriaceous, usually lanceolate or ovate-lanceolate, 2 to 3 inches long, acute and contracted into a petiole, but varying to elliptical or obovate and very obtuse. Cymes contracted into small heads on rigid angular peduncles, which are often 2 together in the upper axils or several in a small terminal leafy thyrsus. Bracts shorter than the sepals. Sepals orbicular or broadly ovate, concave, hirsute and ciliate, about $1\frac{1}{4}$ line long. Corolla-tube shorter than the sepals, lobes ovate rather longer than the tube, the upper inner one rather larger than the others. Ovary very hairy.—A. tomentosa, *Jacq.*;—*R. Br. Prod.* 518; *Schau. in DC. Prod.* xi. 699;—*Wall. Pl. As. Rar. t.* 271;—*Wight Ic. t.* 1481;—*Benth. Fl. Aust.* v. 70.

This small tree or shrub is met with in the tidal backwaters near the coast throughout India and in Africa, America and Australia; the bark is used for tanning. A preparation made from the ashes of its wood is used by dhobies for washing cotton cloths, and by painters to mix with their colors to make them adhere.

Analysis, Pl. XXII, fig. 2.

1. A flower.
2. Corol open, shewing the 4 stamens.
3. A stamen.
4. Ovary, style and stigma.
5. Transverse section of the ovary.
6. Vertical section of the ovary 1-celled, with 4 ovules collaterally suspended from a central column. (Drawn from dried specimens.)

SUB CLASS III—MONOCHLAMYDEÆ.

ORDER LX—NYCTAGINEÆ.

Perianth simple, inferior, the lower portion persistent and enclosing the ovary and fruit, the upper portion variously shaped, with 5 rarely 4 angles, folds, teeth or lobes, deciduous or withering. Stamens either of the same number as the folds or teeth of the perianth or fewer or more, often inconstant in the same species, and never more than 20, inserted on (or united at the base with) a narrow or cupshaped disk more or less adnate to the stipes of the ovary within the perianth (or rarely free from the base ?) ; filaments slender usually exserted ; anthers 2-celled, the cells attached back to back and opening longitudinally round the outer margin. Ovary shortly stipitate within the base of the perianth, 1-celled, with 1 erect anatropous ovule. Style terminal, simple, undivided, with a single stigma. Fruit 1-seeded, enclosed in the persistent tough or hardened base of the perianth which falls off with it, having the appearance of a pericarp, the real pericarp thin and membranous more or less adherent to and often inseparable from the equally thin testa of the seed. Embryo curved transversely folded or longitudinally convolute around or within a mealy albumen, radicle inferior. Herbs, shrubs or trees, the nodes often tumid and articulated. Leaves usually opposite, often unequal in each pair, rarely alternate, usually entire or scarcely sinuate. Flowers solitary clustered or umbellate, the bracts often forming an involucre round them, sometimes large and coloured, but often small.

An order of no importance to the forester. Besides the Pisonia aculeata, a climbing or straggling shrub, it is only represented in S. India by the genus Boerhaavia, which yields 2 or 3 small herbaceous plants. Of introduced plants Pisonia morindifolia (the Lettuce tree) and the beautiful Bugainvillæas (creepers), and the Mirabilis (Marvel of Peru) are common in our gardens.

PISONIA. Linn.

Gen. Char. Flowers hermaphrodite or unisexual. Perianth in the hermaphrodite flowers contracted above the ovary, in the males campanulate, in the females ovoid or cylindrical, the margin in all 5-angled or 5-toothed. Stamens usually 6 to 8 longer than the perianth, none in the female flowers. Ovary entirely wanting or imperfect in the male flowers. Stigma in the females dilated, oblique. Fruiting perianth oblong or elongated, 5-ribbed, smooth or glandular-muricate, crowned by the small withered limb of the perianth. Seed oblong with a deep longitudinal furrow. Albumen scanty. Embryo straight, the cotyledons convolute over the intruded testa. Trees, shrubs or woody climbers. Leaves opposite or scattered. Flowers in dense or loose cymes, often arranged in terminal panicles. Bracts and bracteoles very small or none.

1. Pisonia aculeata, *Linn.*—A tall woody climber, forming impenetrable masses on the borders of forests reduced to a low straggling bush in open places, glabrous or rarely pubescent ; often armed with stout recurved axillary prickles (abortive peduncles). Leaves opposite or here and there alternate, petiolate, ovate, often broad, or rarely oblong or lanceolate obtuse, entire, rarely exceeding 3 inches and often all under 2 inches long. Flowers diæcious, in small dense cymes or globular clusters, of which several are usually collected into small panicles in the upper axils, the common peduncle rarely exceeding the leaves and often very short. Male perianths shortly pedicellate, campanulate, shortly and broadly 5-toothed, the bud clavate and prominently 4-angled at the top, opening to about 2 lines diameter. Female perianths nearly sessile, ovoid, about 1 line long, obscurely 5-toothed, enclosing the ovary, the style shortly protruding, with a deeply lobed or fringed stigma. Fruit in loose cymes forming often large panicles, the pedicels lengthening to above ½ inch, the enlarged perianth oblong or linear-clavate, ¼ to ½ inch long, 5-ribbed, glandular-muricate. *Wight Ic. t.* 1763, 1764. P. villosa, *Poir.* ;—*Chois. in DC. Prod.* xiii. 11. 440. P. limonella, *Blume* ;—*Chois. l. c.* 446 ;—*Benth. Fl. Aust.* v. 279.

A common shrub throughout India and Ceylon up to 3000 feet elevation ; it is also found throughout the tropical regions of the new and old world.

Analysis, Pl. XXII, fig. 3.

1. A male flower bud.
2, 3. Full male flowers.
4. The calyx of male flower,
5. Anther, front view.
6. Anther, back view.
7. Stamens and abortive ovary.
8, 9. Abortive ovary cut vertically and horizontally.
10. A female flower.
11. Female flower, opened disk, ovary, style and 3-cleft stigma.
12. Ovary cut vertically, 1 cell, 1 erect ovule.
13. Ovary cut transversely.
14. Fruit.
15. Fruit opened, exposing the seed.
16. Vertical section of seed, the cotyledons convolute over the intruded testa.
17. The embryo removed. (Drawn from living flowers.)

ORDER LXI—MYRISTICEÆ.

Flowers diæcious, regular. Perianth deciduous, 3-lobed or rarely 2-or 4-lobed, the lobes valvate in the bud. Male flower : Stamens united in a central column, anthers 3, 6, or more adnate to the column at the apex, or in a ring immediately below the column, each with 2 parallel cells opening longitudinally. Female flower : Ovary free within the perianth, with a single erect anatropous ovule ; stigma sessile or nearly so, capitate or depressed. Fruit succulent, opening tardily in 2 valves. Seed erect, sessile, more or less covered with a lobed or jagged often scarlet arillus (arillodium) proceeding from the base of the seed. Albumen remarkably ruminate. Embryo very small, at the base of the seed, with divaricate cotyledons. Trees, often aromatic. Leaves alternate, entire, usually

dotted, penniveined, without stipules. Flowers small, in axillary or supra-axillary racemes or panicles, more numerous in the males than in the females. Bracts minute or none.

This order is limited to the genus Myristica (which yields the Nutmeg of commerce.) In this presidency we have 5 species, all large trees, confined to our moist western forests; all of these I have figured. A 6th species, M. ATTENUATA, *inhabits the Bombay ghats, and will probably also be found in Canara and Mysore; and 2 others,* M. HORSFIELDIA *and* M. IRYA, *are found in Ceylon. The timber of several of our Indian species appears to be of fine quality, but it has never been tried. The order should receive the attention of forest officers.* MYRISTICA MOSCHATA (*the true nutmeg*) *is very common in cultivation on the west side of the Presidency and on the Tinnevelly mountains.*

MYRISTICA. LINN.

Gen. Char. the same as that of the order.

1. MYRISTICA LAURIFOLIA, *H. f. et T.*—For description, &c. see Pl. cclxvii.

2. MYRISTICA MAGNIFICA, *Bedd.*—For description, &c. see Pl. cclxviii.

3. MYRISTICA MALABARICA, *Linn.*—For description, &c. see Pl. cclxix.

4. MYRISTICA FARQUHARIANA, *Wall.*—For description, &c. see Pl. cclxx.

5. MYRISTICA CORTICOSA, *Lour.*—For description, &c. see Pl. cclxxi.

6. MYRISTICA ATTENUATA, *Wall.*—A tall tree, branches slightly scurfy, leaves membranaceous oblongo-lanceolate long attenuated, acute or rounded at the base, sub-furfuraceous on the costa and veins, glabrescent in age, glaucous beneath, 5-8 inches long by $1\frac{3}{4}$-$2\frac{3}{4}$ inches broad; the lateral veins 12-20 on each side, petioles 5-6 lines long, peduncles axillary 3-4 flowered, pedicels longer than the peduncle bracteolate at the apex, perianth subglobose laxly tomentose, antheriferous disk flat surrounded by 12 anthers, fruit oval or oblong fulvo-tomentose, $1\frac{1}{2}$ inch long, aril thin. *Wall. List.* 6791;—*H. f. et T. Fl. Ind. p.* 157.

On the Concan ghats in Bombay. The section *Knema*, to which this and M. corticosa belong, is well distinguished from the rest of the genus (except M. Irya, in which the disk is concave) by the staminal column being dilated at the apex into a flat disk round which the anthers are placed; it is made a separate genus by some. I have not seen this species, and it is perhaps not distinct from No. 5

7. MYRISTICA HORSFIELDII, *Bl.*—A very large tree, young branches densely tomentose, young parts floccoso-tomentose, leaves ovato-oblong acuminate, glabrous above, beneath stellato-pubescent, 6-9 inches long by $2\frac{1}{3}$-$3\frac{1}{2}$ inches broad, panicles axillary the male 3-6 inches long branched, the branches alternate bearing 3-5 subsessile heads, the female generally much shorter simple densely furfuraceo-tomentose, flowers very fragrant; *the male* densely glomerate sessile obconical, perianth 3-4 parted, anthers 6 adnate to the slender column which is clavate at the apex, the connective not produced beyond the apex; *the female* lax subsessile swollen at the base, ovary tomentose, stigma sessile undivided, fruit ovoid ferrugineo-tomentose, aril fleshy complete undivided. *Bl. Bijd.* 577;—*H. fil. et T. Flora Ind.* 163. Pyrrhosia Horsfieldii, *Wight Icones tab.* 1857. Myristica Iryaghedhi, *Gærtn.* i. *t.* 41, *exparte.* Horsfieldia odorata, *Willd. Sp.* iv. 872. M. Iriagedi, *Spr. Syst. fig.* iii. 65. M. ferruginea, *Wall. cat.* 6803.

Ceylon, abundant in the Ambagamwa and Ratnapoora districts up to 1000 feet elevation, called Rook; the fragrant flowers are used by the natives as a perfume for scenting their clothes.

8. MYRISTICA IRYA, *Gærtn.*—A large tree, young parts slightly puberulous, leaves variable in form, oblong or linear-oblong rounded or acute at the base, glabrous on both sides, 5-10 inches long by $1\frac{1}{2}$-$2\frac{1}{2}$ inches broad, petiole $\frac{1}{3}$-$\frac{2}{3}$ inch long, panicles from the old axils much branched 3-6 inches long, bracts ovate glanduloso-punctate deciduous, flowers minute glabrous, perianth 2-3 parted glabrous, staminal column pyriform concave at the apex antheriferous round the margin, anthers 6-8. Stigma depressed entire or scarcely lobate, fruit globose nearly 1 inch in diameter granuloso-tuberculate but glabrous, valves thick coriaceous reddish and glabrous on the inside, aril complete thin fleshy scarlet, seed globose, hilum small. *Gærtn. Fruct* i. 195. *t.* 41;—*H. f. et T. Fl. Ind.* 159. M. Javanica, *Bl. Bijd.* 576. M. sphærocarpa, *Wall. Pl. As. Rar.* i. *t.* 89. M. exaltata, *Wall. cat.* 6804 *partim.*

Ceylon, common in damp places up to 2000 feet elevation, called Irya; also found in Birmah, Java and Borneo. This belongs to the section *Irya*, distinguished by its staminal column being dilated into a concave disk.

ORDER LXII—MONIMIACEÆ.

Perianth regular, usually at first globular or nearly so and more or less adnate to or continuous with the expanded receptacle or staminal disk, the limb of 4 or more connivent lobes or segments in 2 or rarely more rows, but all of similar texture, calycine or scarcely petaloid, deciduous or persistent. Stamens either definite and opposite the perianth-segments or more frequently indefinite and irregularly arranged in several rows; filaments very short; anthers adnate, usually extrorse, the cells opening in separate valves or in longitudinal slits, either distinct or confluent at the apex. Gynæcium of several carpels free and distinct rarely reduced to a single one, each with a single ascending or pendulous antropous ovule, style terminal usually oblique excentrical or almost lateral, filiform or very short or almost none, with a small or pulvinate terminal stigma. Fruit of several (or rarely only one) 1-seeded drupes or nuts, resting on the expanded receptacle or persistent portion of the perianth-tube or enclosed in the enlarged perianth. Seed with a membranous testa and fleshy albumen. Embryo usually very small, with divaricate or appressed cotyledons and a short or long radicle next the hilum. Trees, shrubs or woody climbers, usually glandular-dotted and aromatic. Leaves opposite entire or toothed, without stipules. Flowers solitary or in trichotomous cymes or definite raceme-like or thyrsoid panicles, axillary or rarely terminal. Bracts usually very small.

This order is only represented by the genus Hortonia, which yields a shrub or small tree only as yet detected in Ceylon.

HORTONIA. Wight.

Gen. Char. Flowers hermathrodite or polygamous, sepals about 30 in many series imbricate slightly cohering at the base, the exterior ones thickish rounded, the interior longer and thinner, the innermost ligulate acute. Stamens 7-10 in a single series at the margin of the torus, filaments cylindrical furnished at the base with 2 large cucullate stipitate glands, anthers extrorse adnate broadly oval 2-celled, dehiscing longitudinally, ovaries few or indefinite oblong or ovoid-oblong attenuated into a simple style, stigma dilated, ovule solitary pendulous, drupe obovoid compressed attenuated into a stipe at the base, putamen smooth fragile, seed pendulous, testa thin, chalaza large basal, raphe marginal conspicuous, albumen copious fleshy, embryo minute included in the albumen, cotyledons oval obtuse divaricate, radicle superior. Shrubs or small trees, leaves opposite entire, inflorescence cymose axillary, flowers yellowish. *Wight et Arnt. in Ann. Zool. Bot. 2 p. 545.*

1. Hortonia floribunda, *Wight.*—A small tree or shrub, young parts stellately puberulous, leaves petioled from oval obtuse to oblongo or ovato or linear-lanceolate acuminate coriaceous entire penniveined glabrous, 3-7 inches long by $\frac{1}{2}$-$2\frac{1}{2}$ broad, petioles $\frac{1}{2}$-$\frac{2}{3}$ inch long, peduncles axillary 1-3 inches long cymose, few flowered, flowers rarely reduced to only 1, pale yellowish green very variable in size, sometimes polygamous, exterior leaves of the perianth and pedicels minutely stellato-puberulous. *Wight. l. c.* Hortonia floribunda, ovalifolia et acuminata, *Wight Icones. tab.* 1997, 1998.

Ceylon, from the sea level up to 6000 feet, called Waaweya; a very variable plant. The lower level form (common at Badagam) has narrower leaves and much smaller flowers, and is sometimes polygamous with very small effete ovaries.

Analysis, Pl. XXV, fig. 3.

1. Branch in flower.
2. Flower, underneath view.
3. Flower, front view.
4. A stamen and the glands. (Drawn from flowers in spirits collected near Galle in Ceylon.
5. Ovaries.
6. An ovary removed.
7. Vertical section of ovary.
8. Branch of fruit.

9—11. Analysis of fruit, seed and embryo. (From drawings communicated by Dr. Thwaites.)

ORDER LXIII—PROTEACEÆ.

Flowers hermaphrodite or rarely partially unisexual. Perianth regular or irregular, deciduous, consisting of 4 segments valvately united in the bud, the claws forming a tube cylindrical or dilated towards the base, the laminæ short, forming a globular ovoid or rarely elongated limb; the segments at length separating either from the base upwards or revolute from the lamina downwards, leaving a portion of the tube entire or open on one side, the laminæ sometimes cohering long after the segments have separated lower down. Stamens 4, opposite the perianth-segments and usually inserted on them, either with the filaments wholly adnate leaving the anthers sessile at the base of the laminæ, or the filaments shortly free below the laminæ, or very rarely the stamens entirely free from the perianth; anthers various all perfect or rarely partially abortive, most frequently with 2 parallel cells adnate to a connectivum continuous with the filament. Hypogynous or perigynous glands or scales in many genera 4, alternating with the stamens, but in some genera variously united or reduced in number or wholly deficient. Ovary 1-celled, sessile or stipitate, more or less excentrical, with a single terminal undivided style variously shaped at the end, with a small terminal oblique or lateral stigma. Ovules either solitary or 2 collaterally attached or slightly superposed, or several imbricate in 2 contiguous rows, either pendulous and orthotropous, or more frequently laterally attached and more or less amphitropous, rarely erect and anatropous, the micropyle always inferior and frequently prominent from the incomplete development of the primine. Fruit either an indehiscent nut or drupe, or a more or less dehiscent coriaceous or woody follicle, very rarely a completely 2-valved capsule; either 1-celled and 1-seeded, or when 2 seeds are ripened in a drupe, sometimes really 2-celled from the growth of the endocarp between as well as round the seeds, or when 2 or more seeds ripen in a follicle, apparently 2-or more-celled by the consolidation of the external coating of the 2 adjoining seeds into a membranous or woody plate detaching itself from the remainder of the seed. Seeds without albumen, the testa usually thin rarely coriaceous or hard; embryo straight, with fleshy cotyledons and a short inferior radicle. Shrubs or trees, rarely undershrubs or even perennial herbs. Leaves alternate or scattered, in a very few genera strictly opposite or verticellate, but often crowded under the inflorescence so as to appear verticellate, usually coriaceous, often vertical with stomata on both sides, or in the same genera horizontal or narrow and terete, entire toothed or variously divided, without stipules. Flowers axillary or terminal, solitary or in racemes or spikes, often condensed into umbels, heads or cones, each flower or pair of flowers subtended by a bract, very deciduous in some genera and perhaps sometimes really deficient.

A very large Australian and South African order, but it is not one of any importance to the Indian forester; the only genus represented in S. India is Helicia, and this yields 2 small trees, one on the Tinnevelly ghats and one in Ceylon, both at elevations between 2000 and 4000 feet, and one shrub (slopes of the Nilgiris, 3-4000 feet.)

Numerous species of Hakea, and several species of Grevillea and Banksia, introductions from Australia, are growing admirably in our gardens at Ootacamund, and I am endeavouring to introduce more plants of this interesting order, as they will probably all thrive well on the Nilgiris. Grevillea robusta and Stenocarpus salignus are thriving well at Madras and Ootacamund (i.e., sea level and 7000 feet), the former of these two is a very valuable introduction as an ornamental tree, and it might be largely planted at most stations. Leucodendron argenteum, the Silver Tree of the Cape, has been introduced and grows well on our mountain ranges, the beautiful Telopea speciossisima (the Waratau of New So th Wales), and the splendid Cape Proteas are desirable introductions for our mountain gardens.

Tribe Grevilleaæ.—Ovules 2-4, seeds without any intervening substances or separated by a thin lamina or mealy substance. Flowers in racemes or clusters with deciduous or abortive bracts, or with an involucre of imbricate bracts.

Ovules 2 ascending, perianth regular or nearly so, leaves alternate, fruit with a thick woody indehiscent pericarp or putamen..... Helicia.

HELICIA. Lour.

For Gen. Char. see letter-press to Pl. ccci.

1. Helicia robusta, *Wall.*—For description, &c. see Pl. ccci.

2. Helicia Nilagirica, *Bedd. Mad. Journ. of Lit. July* 1864 (cum. fig).—A shrub, glabrous, leaves broad ovate elliptic or lanceolate acute attenuated at the base coarsely and sharply dentate with large sinuses except at the very base, prominently veined and reticulated sub-membranaceous, racemes much shorter than the leaves, peduncles very short, each bearing 2 pedicels 3-6 lines in length, a bract at the base of the peduncle and a bracteole on each pedicel near its base, fruit 5 lines in diameter.

Western slopes of the Nilgiris 3-4000 feet elevation abundant. This differs from the last in being only a shrub and in the leaves being petioled and acute at the base and much more membranaceous, the fruit is also much smaller.

3. Helicia Ceylanica, *Gardn.*—A middling sized glabrous tree, peduncles and pedicels purplish, leaves rather coriaceous entire oblongo or obovato-elliptic obtuse attenuated into a short petiole, veins prominent on both sides slender laxly reticulated, 4-5 inches long by 1¼-2 inches broad, petioles about ½ an inch long, racemes axillary solitary subsessile about equalling the leaves laxly flowered, pedicels slender 3-4 lines long from a very short peduncle, calyx glabrous 8-9 lines long a little swollen at the base, ovary glabrous, hypogynous glands obtuse semicuneate, flowers pale yellow, fruit ovoid slightly acuminate at both ends, blackish purple about 1 inch long. *Gardn. Calc. Journ. of Bot. vol.* vii. *p.* 453 ;—*DC. Prod.* xiv. *p.* 438 ;—*Thw. En. Pl. Zey. p.* 250.

Ceylon, central provinces, 2000-4000 feet elevation.

ORDER LXIV—THYMELÆACEÆ.

Flowers hermathrodite or rarely unisexual, polygamo-diæcious, 4-or rarely 5-merous. Calyx inferior, corolla-like or rarely herbaceous gamosepalous, tubular, funnel-shaped, campanulate, or urceolate, deciduous or marcescent, tube continuous or articulately breaking above the base with the base persistent in fruit, lobes 4-5 imbricate with often the addition of 1-2 small scales alternating with the lobes at their base connivent or spreading, scales hypogynous, 4-8, small membranaceous fleshy or filiform, placed round the ovary, free or connate into a ring or cup or adnate to the calyx, rarely obsolete or wanting. Stamens 2-4, 4-5 or 8-15, generally in 2 series when double as many as the lobes of the calyx, inserted into the jaws or on the tube, filaments filiform or flat adnate to the tube or throat or base of the lobes, included or exserted, anthers 2-celled oval oblong or linear affixed by the base or back erect or versatile dehiscing longitudinally, ovary free 1-2 celled, ovule 1 solitary pendulous or 2-3 collateral or superposed, style simple lateral or terminal filiform deciduous or often very short or wanting, stigma capitate sphœroid or subclavate, papillose or rarely smooth, fruit indehiscent, nucamentaceous drupaceous or baccaceous, 1-rarely 2-celled, cells 1-rarely 2-3-seeded or (in Gyrinops and Aquilaria only) a capsule opening loculicidally in 2 flat valves with the narrow dissepiment in their centre, seed without or with albumen, embryo straight with a superior radicle. Trees, shrubs or climbers or rarely herbs, leaves simple and entire alternate or opposite without stipules, flowers in terminal or axillary clusters, heads, umbels, racemes or spikes.

Not an order of any importance to the forester ; it is only represented in this Presidency by one large shrub or small tree (Lasiosiphon eriocephalus) which is common on the mountains on the west side of the presidency, and by one climber (Cansjera Rheedii). In Ceylon the genera Gyrinops and Phaleria each yield 1 *small tree, and Wikstrœmia a shrub ; but these* 3 *genera have not yet been detected in the peninsula.*

In East Bengal the genus Aquilaria *yields a large tree, and the genus* Linostoma *a shrub, and the genus* Daphne *is represented by* 5 *shrubs in Northern Bengal, the Himalayas, Khasya, Sylhet, &c.*

SUB ORDER Thymeleæ.—Ovary 1-celled, ovule solitary.

Stamens twice as many as calyx-lobes.	
Calyx 4-lobed	Wikstræmia.
Calyx 5-lobed	Lasiosiphon.
Stamens equal in number to calyx-lobes	Cansjera.

SUB ORDER Aquilarineæ.—Ovary 2-celled, cells 1-ovuled (or 1-celled placentas 2 parietal.)

Calyx 5-lobed, anthers sessile	Gyrinops.
Calyx 4-lobed, anthers with filaments	Phaleria.

WIKSTRÆMIA. Endl.

Gen. Char. Calyx or perianth with a spreading 4-lobed limb without scales at the throat, anthers 8 in 2 rows near the top of the tube, perigynous scales none, hypogynous scales 4-5 or 2 small linear free or connate below, ovary 1-celled with 1-pendulous ovule, style terminal short or obsolete, stigma subcapitate, berry drupaceous, seed without albumen. Leaves opposite or alternate, flowers in short terminal or axillary racemes or spikes.

1. Wikstræmia virgata, *Meisn.*—A shrub with twig-like branches, puberulous or tomentose at the top, leaves alternate herbaceous or subcoriaceous short petioled oblong or lanceolate sparingly adpressedly pilose or subglabrous, peduncles hairy tomentose terminal and from the upper axils shorter than the leaves, flowers shortly pedicellate racemoso-capitate hoary-tomentose, lobes of the calyx very short obtuse, tube 8-striated within, anthers on filaments nearly their own length, ovary stipitate pubescent, hypogynous scales 4-5 more or less connate. *Meisn.* ;—*DC. Prod.* xiv. 547. W. canescens et inamœna, *Meisn.* ;—*DC. l. c.* W. salicifolia, *Decaisne* ;—*DC. l. c.* Daphne inamœna, *Gard. in Calc. Journ. of Nat. Hist.* vii. *p.* 454.

Ceylon, central provinces, 6000-8000 feet elevation.

Analysis, Pl. XXV, fig. 4.

1. A branch in flower.
2. The calyx or perianth opened, lobes very short, tube 8-striated within, anthers on filaments nearly their own length.
3, 4. Stamens, front and back view.
5. Ovary and sessile stigma, and the linear hypogynous glands, 1 free, 4 connate.
6. Ovary out vertically, shewing the single cell and 1 pendulous ovule (the ovary should be in a longer stipe). From a drawing communicated by Dr. Thwaites.

The genus is generally described as with sessile anthers, and this species as having 4 free hypogynous glands ; in all the flowers I have dissected, I found Dr. Thwaites's analysis correct as to the filaments, and the hypogynous glands are all slightly connate at the base and all but 1 up to the apex.

LASIOSIPHON. Fresen.

Gen. Char. Flowers hermathrodite 5-merous. Calyx or perianth colored pubescent outside, glabrous within, tube slender, limb 5-parted regular spreading. Scales 5-petaloid, inserted into the jaws of the tube at the sinus of the lobes alternate with the upper stamens, exserted glabrous entire or bifid, sometimes obsolete. Stamens 10 in a double row near the apex of the tube subsessile or with short filaments, anthers affixed near the base, linear or oblong obtuse, hypogynous ring membranaceous surrounding the ovary at the base small or obsolete, ovary sessile or stipitate, style equalling the calyx-tube, stigma capitate papillose, fruit included in the persistent base of the calyx. Seed sparingly albuminous. Shrubs or small trees, leaves scattered or opposite, flowers in terminal or subterminal heads usually many-flowered surrounded by a many-leaved involucre, receptacle hemispherical villous.—Enkleia, *Griff. in Calc. Journ. of Nat. Hist.* 4. *n.* 13. Gnidia, *Wight* (not *Linn.*)

1. Lasiosiphon eriocephalus, *Dcne.*—A large shrub or small tree up to 25 feet high, leaves alternate scattered, lanceolate acute to oblong obtuse glabrous, very shortly petioled, 2-3 inches long by $\frac{1}{2}$-1 inch broad, the involucral ones nearly equaling the short peduncled or subsessile capitule, oblong hoary imbricate, calyx 5-10 lines long villous with long white or brown hairs. Scales linear obovate or obcordate. *Decaisne in Jacq. Voy. p.* 148 ;—*DC.* xiv. *p.* 597. L. speciosus, *Dcne. l. c.* ;—*DC.* xiv. 598. L. Metzianus, *Miq.* ; —*DC. l. c.* 598. L. insularis, *DC. l. c.* 598. L. Sisparensis, *DC. l. c.* 598. Gnidia eriocephalus and Sisparensis, *Wight Icones* 1859 & 60. Gnidia insularis, *Gardner* (and probably Lasiosiphon Hugelii, *DC.*)

This is very common on all the mountainous tracts of the western side of this Presidency and Bombay, generally on the outskirts of woods, up to an elevation of 5000 feet, also in Ceylon and N. Bengal ; it is rather variable in the shape of the leaves and pubescence and shape of the perianth scales, and DeCandolle divides it into 5 or 6 species, but they all merge one into the other. The bark is used for poisoning fish in South Canara and Ceylon, and a very excellent fibre is made out of it ; in Ceylon the plant is called Naha.

Analysis, Pl. XXV, fig. 2.

1. Portion of a branch in flower.
2. A flower bud.
3, 4. Full flowers.
5. Flower opened.
6. Ovary, style, and stigma.
7, 8. Anthers, front and back view.
9. Ovary cut vertically.
10. Ovary cut tranversely. (All drawn from living specimens collected on west slopes of Nilgiris, 4000 feet elevation.)

CANSJERA. Gmel.

Gen. Char. Calyx or perianth short deciduous with 4 small lobes spreading or recurved, without scales in the throat. Stamens 4 with slender filaments inserted at the base of the perianth, hypogynous scales 4 alternating with the stamens, ovary fleshy with a minute cavity, and 1 (or 2 or 3 when very young) pendulous ovule. Fruit a berry with a single erect seed, embryo small towards the summit of a fleshy albumen. Shrubby climbers, leaves alternate, flowers small in axillary spikes.

1. Cansjera Rheedii, *Gmel.*—A climbing shrub, young branches and inflorescence minutely pubescent or glabrous, leaves almost sessile ovate-acuminate or broadly lanceolate, $1\frac{1}{2}$-2 inches long glabrous ever-green and rather thick. Spikes about 1 inch long. Flowers yellow, sessile, rather distant, perianth about $1\frac{1}{2}$ lines long with 2 minute bracteoles at the base. *Gmel. in DC. Prod.* xiv. 519 ; —*Wight Icones tab.* 1861;—*Benth. Fl. Hong Kong* 296. C. lanceolata, *Benth. in London Journ. Bot.* i. 491.

This plant is common in hedges, &c., in the plains throughout the peninsula and Ceylon, also in the Archipelago and Hong-kong.

Analysis, Pl. XXVI, fig. 6.

1. Portion of a branch and spike of flowers.
2. Magnified portion of the spike.
3. A single flower.
4. Flower open.
5. Ovary, stigmas and the hypogynous glands.
6. Anther, front view.
7. Anther, back view.
8. Branch in young fruit, the remains of the hypogynous glands still visible.
9. Young fruit cut vertically, showing the single erect seed.

GYRINOPS. Gærtn.

For Gen. Char. seeletter-press to Pl. cccliii.

1. Gyrinops Walla, *Gærtn.*—For description, &c. see Pl. ccci ii.

PHALERIA. Jack.

Gen. Char. Calyx colored, funnel-shaped, limb 4-cleft, lobes subequal, jaws naked, stamens 8 inserted near the su mmit of the tube, filaments exserted the alternate ones opposite the calyx-lobes longer, ovary sessile surrounded at the base with a cup-shaped disk, style terminal filiform exserted, stigma capitate papillose, drupe ovoid. Trees or shrubs, leaves opposite or alternate coriaceous short petioled, flowers in heads or umbels axillary terminal or cauline furnished with a common involucre. *Jack Malay Misc.* Drymispermum, *Reinw.*

1. Phaleria cauliflora, *Thw.*—A small elegant glabrous tree, branches elongate subpendulous, leaves shining oblongo-lanceolate with a longish acumination acute at the base, shortly petioled, 6-9 inches long by 1½-3½ inches broad, capitules cauline very shortly pedunculate, bracteoles ovate acute about 3 lines long, flowers white 8 lines long, calyx glabrous, lobes rounded obtuse villous at the margins, stamens in 2 series, filaments alternately slightly longer, fruit ovoid a little acuminate about the size of a nut fleshy red. —Drymispermum cauliflorum, *Thw. En. Pl. Zey. p.* 251.

Ceylon, Hewisi, on the banks of a stream.

Analysis.

1. Portion of a branch in leaf.
2. Flowers.
3. A flower open.
4. Stigma.
5. Bract or involucre-leaf.
6. View of an anther.
7. Ovary.
8. Vertical section of the same.
9. Transverse section of the same.
10—13. Analysis of the fruit. (From a drawing communicated by Dr. Thwaites.)

ORDER LXV—ELÆAGNACEÆ.

Perianth tubular, free but persistent at the base and contracted above the ovary, the upper portion deciduous 2-or 4-lobed Stamens equal to and alternate with the perianth-lobes or twice as many, inserted in the tube or at its base. Anthers 2-celled, opening longitudinally. Ovary 1-celled, with 1 erect ovule. Fruit indehiscent, usually succulent, enclosed in the persistent base of the perianth. Seed with a very thin or without albumen. Embryo straight, the radicle inferior. Trees or shrubs, more or less covered with scurfy stellate scales. Flowers in axillary clusters or cymes.

An order of no importance to the forester ; it is only represented by a single species of Elæagnus, a small straggling tree or large shrub. In Northern India the genus Hippophae yields a small tree.

ELÆAGNUS. Linn.

Gen. Char. Flowers hermaphrodite. Perianth 4-lobed valvate in the bud. Stamens 4, inserted in the tube. Style subulate, recurved, and stigmatic along one side at the top.

1. Elæagnus latifolia, *Linn.*—A straggling shrub or small tree, armed or unarmed, more or less densely rusty-scurfy, leaves elliptic or oblong, glabrous above, covered beneath with silvery or ferruginous scales, flowers axillary pedicelled or subsessile in dense heads or racemose or subsolitary, silvery and more or less scurfy, tube of calyx cylindric, limb 4-angular, fruit oblong succulent edible. *Linn ;—Wight Icones,* 1856. E. conferta, parvifolia et arborea, *Roxb.* E. ferruginea, *A. Rich.* E. Wallichiana, *Sch.* E. Thwaitesii, *Schl.* E. kologa, *Schl.*

A very variable plant, common almost throughout India and Ceylon up to 8000 feet ; its fruit makes good tarts.

Analysis, Pl. XXV., fig. 1.

1. Portion of a branch in flower.
2, 3. Flowers.
4. Flower opened.
5, 6. Anthers, front and back view.
7. Vertical section of ovary.
8. Transverse section of ovary.
9. Fruit.
10. Vertical section of fruit.
11. Transverse section of fruit.
12—15. Seed and embryo.
16. Magnified portion of the under surface of the leaf.
17. Portion of a peduncle.
18. A magnified scale. (Partly from Dr. Wight's drawing, partly from living flowers.)

ORDER LXVI—SANTALACEÆ.

Flowers hermathrodite or diæcious. Perianth-tube wholly or partially adnate, the limb with 3 to 5 lobes or segments, valvate in the bud. Stamens as many as the lobes and opposite to them, inserted at their base or within the free part of the tube. Anthers 2-celled, opening longitudinally. Ovary inferior, 1-celled, with 3 to 5 ovules suspended from a free erect placenta. Fruit an indehiscent nut or berry, with a single seed. Albumen fleshy. Embryo straight with a superior radicle. Herbs or shrubs, rarely trees. Leaves alternate or rarely opposite, entire, without stipules. Flowers usually small and green, in terminal or lateral heads, cymes, or spikes.

This order yields the Sandalwood (Santalum album) so common in the hill tracts of Mysore, Salem and Coimbatore, but otherwise it is of no importance. Pyrularia Wallichiana, a small tree common in Coorg, and Osyris arborea, a shrub, are the only other trees or shrubs. Thesium Wightianum is a small suffruticose plant found on the Nilgiris. Henslowia is a genus found in N. India yielding one shrub.

Thorny—
  Flowers unisexual .. .. PYRULARIA.
Unarmed—
  Flowers hermathrodite, stamens 4-5 .. .. SANTALUM.
  Flowers unisexual, or female and hermathrodite, stamens 3 ... ... OSYRIS.

PYRULARIA. MICH.

For Gen. Char. see letter-press to Pl. ccciv.

1. PYRULARIA WALLICHIANA, *A. DC.*—For description, &c. see Pl. ccciv.

SANTALUM. LINN.

For Gen. Char. see letter-press to Pl. cclvi.

I. SANTALUM ALBUM, *Linn.*—For description, &c. see Pl. cclvi.

OSYRIS. LINN.

Gen. Char. Flowers unisexual, or male and hermathrodite, perianth-tube slender in the male flowers, obconical in the female, or hermathrodite, deeply 3-(4-) lobed, lobes ovate acute. Stamens 3 (4), filaments short, anthers 2-celled, disk concave, lobes round covering the upper and entire portion of the perianth, ovary fleshy inferior, style short, stigmas 3 (4) alternate with the lobes of the perianth, placenta straight very short bearing generally 3, sometimes 2-4 ovules at it apex, drupe ovoid globose crowned with the remains of the perianth-lobes and disk, seed filling the single cell, embryo oblique in the upper part of the copious albumen, radicle superior, cotyledons lanceolato-terete semi-incurved longer than the radicle. Shrubs or trees, branches angled, leaves alternate or rarely opposite. Male flowers congested at the apex of the peduncle. Female solitary or few.—Casia, *Cam. Lob., &c. Tourn. inst, p.* 664. Colpoon, *Berg. Pl. Cap. p.* 38.

1. OSYRIS ARBOREA, *Wall.*—A shrub, very ramous, everywhere glabrous, young shoots 3-sided with prominent sharp angles, leaves short petioled, from oblong elliptico-lanceolate to elliptic obovate, mucronate, ½-2 inches long 4-15 lines broad, perianth 3-lobed. *Male* flowers umbellato-capitulate, peduncles axillary and terminal shorter than the leaves, 6-8 flowered; *female*, peduncles axillary and terminal 1-3 flowered elongating in fruit, the anthers often polleniferous, ovary conical, style short, stigma 3-lobed, fruit ¼ inch long small red. *Wall. in DC. Prod.* xiv. *p.* 633. Osyris Wightiana, *Wall. in DC. Prod. l. c.*

This shrub is common on all the mountains on the west side of the Presidency and in Ceylon 5000-8000 feet, it is also found in North Bengal.

Analysis, Pl. XXVI, fig. 6-A.

Dissections of flowers and fruit. (Copied from Dr. Wight's *Icones.*)

ORDER LXVII—SALICACEÆ.

Flowers diæcious naked or with a cup-like bract sessile or shortly pedicelled arranged in sessile lateral subterminal aments, perianth none, torus swelling into a simple or double gland or an obliquely truncated ring or cup. *Male*: stamens 2-many distinct or monodelphous exserted from the centre of the torus, filaments filiform, anthers 2-celled fixed at the base, cells parallel dehiscing longitudinally, rudiment of ovary none. *Female*: ovary free sessile or pedicelled 1-celled formed of 2 carpels with the margins valvately connate or more or less inflexed, ovules numerous erect anatropal at the base of the cell or adhering to the lower part of the sides, styles 2 generally connate or wanting. Stigmas 2-entire or 2-parted the divisions more or less filiform, or fleshy. Capsule leathery 1-celled 2-valved many-seeded, valves separating at the apex, at length more or less revolute, seeds small erect from the lower part of the axis of each valve or from the base of the cells completely covered with long silky hairs which arise from the short funicle, testa membranaceous, albumen none. Embryo erect, cotyledons plane convex elliptic, radicle small inferior. Trees or shrubs, leaves alternate simple entire or more or less serrulate often bearing glands at the serratures, penniveined or obsoletely palminerved, deciduous, stipules scaly deciduous or foliaceous and often persistent oblique subserrate.

This order is only represented in Southern India by one species of Willow (Salix tetrasperma), which is found from the sea level up to the top of our highest mountains. The same species of Salix and several others are found in N. India, and 2 species of Populus (Poplar.)

The Salix Babylonica (or Weeping Willow) is an introduced tree in Southern India.

SALIX. LINN.

For Gen. Char. see letter-press to Pl. cccii.

1. SALIX TETRASPERMA, *Roxb.*—For description, &c. see Pl. cccii.

I

Sarcoclinium longifolium

II

Agrostistachys

Indica

III

Actephila excelsa

IV

Cleistanthus patulus

C. Pallidus.

V

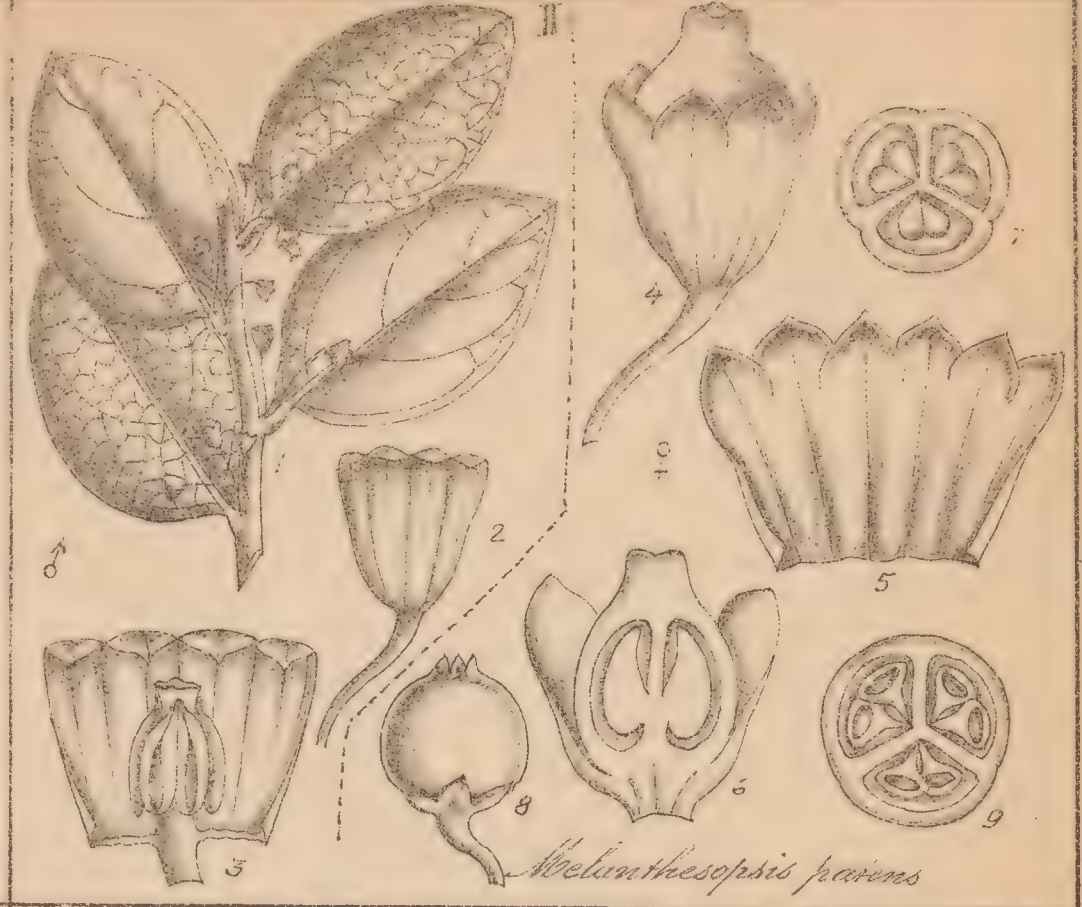
Lebidieropsis orbicularis

VI

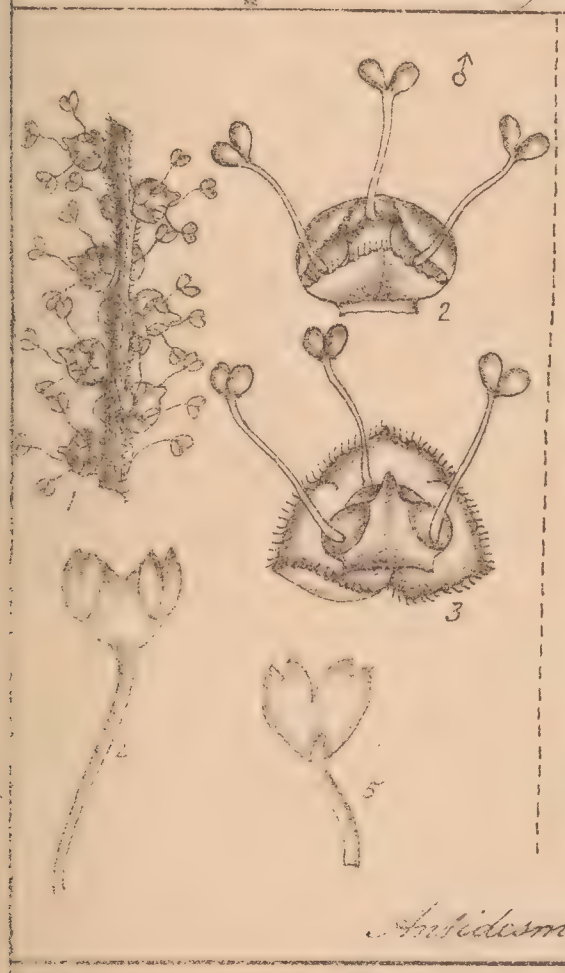
Codiæum umbellulatum

Euphorbiaceæ

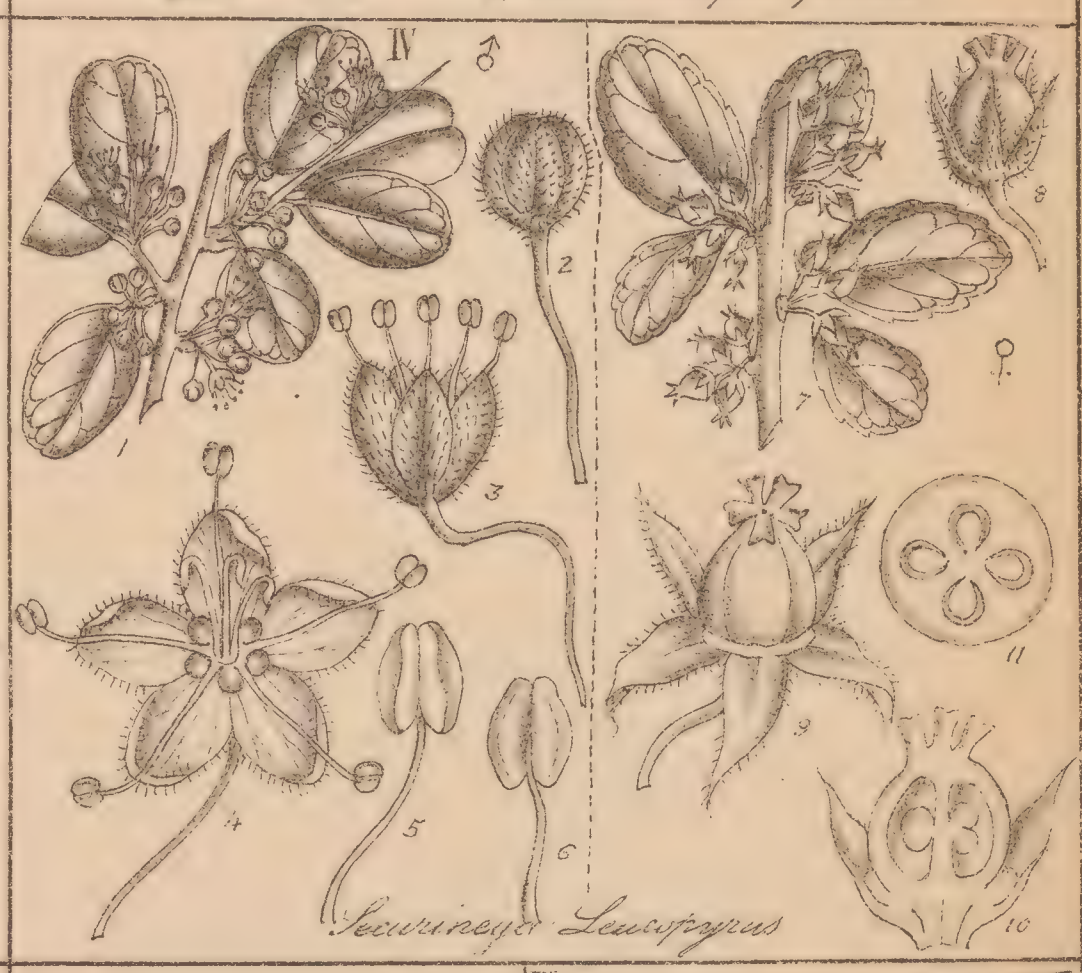
Hamonoya riparia



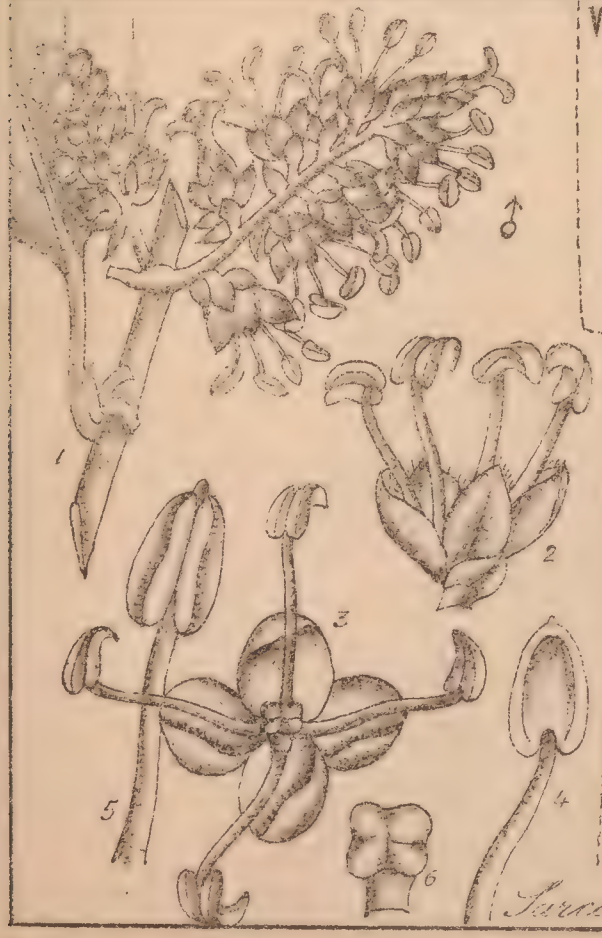
Melunthesopsis parens



Antidesma Bunius



Securinega Leucopyrus



Sarcococca saligna

Phyllanthus Indica

I

Elæagnus latifolia

II

Lasiosiphon eriocephalus

III

Hortonia floribunda

IV

Wikstroemia virgata

V

Pimelea sericea

Urticæ *Thymeleæ* *Santalaceæ.*

I.

Streblus asper.

II.

Plecospermum spinosum

III.

Taxotrophis Roxburghii

T. Zeylanica

IV.

Oreocnide sylvatica.

V.

Morocarpus longifolius

VI.

VI.A

Cansjera Rheedii

Osyris arborea

Dunphy Lith.

I

Cudrania Rumphii

II

Böhmeria ramiflora.

ORDER LXVIII—LAURINEÆ.

Perianth regular, the tube very short or none at the time of flowering, sometimes enlarged over or under the fruit, or rarely adnate to the ovary and fruit; segments 4-8 generally 6, all equal or 3 outer ones smaller, imbricate in the bud. Stamens normally twice as many as perianth segments, those opposite them with introrse anthers, those within and opposite to the outer ones with the anthers extrorse in some genera, introrse in others, but in many genera 3 or sometimes all of the inner stamens, and in others 3 or all of the outer ones reduced to short staminodia or wanting, and in some flowers the stamens abnormally and irregularly increased or diminished in number; there are also frequently a pair of sessile or stipulate rather large glands, one on each side of the filament, either of the inner or rarely of the outer of the two stamens opposed to the inner perianth-segments; anthers adnate, with 2 collateral cells or 2 superposed pairs of cells, each cell opening in a valve from the base upwards or in *Hernandia* from the inner to the outer side. Ovary free, or in *Hernandia* adnate, consisting of a single carpel with one ovule suspended from the apex of the cavity from a funicle adnate to its side, or rarely with a second small abortive ovule. Style simple, often very short, with a capitate disk-shaped or obliquely dilated stigma, entire or shortly and irregularly lobed. Fruit a berry or drupe, rarely dry or nearly so, the perianth entirely deciduous, or the tube enlarged and disk-shaped or cup-shaped under the fruit or more or less succulent and closing over it or adnate to it. Seed pendulous, with a membranous or (in *Hernandia*) a hard testa, without albumen. Embryo with thick fleshy cotyledons filling the seed, enclosing the plumula and short superior radicle. Trees or shrubs, with alternate or rarely irregularly opposite leaves, more or less glandular-dotted and aromatic (except in *Hernandia*) usually entire and evergreen, or, in *Cassytha*, leafless parasitical twiners. Stipules none. Flowers usually small, in cymes reduced sometimes to clusters, umbels or heads, the cymes solitary or arranged in racemes, clusters, or panicles; or, in *Cassytha*, the flowers singly arranged in spikes or racemes.

SUB-ORDER Laureæ.—Anther valves opening upwards.

Tribe I, Perseaceæ.—Flowers hermathrodite (rarely polygamo-dicœcious) without an involucre, or except in Beilschmiedia without imbricate scales, in panicles racemes or spikes, the inner 3 stamens extrorse, staminodia 3 in the male flowers, fruit superior naked or partly surrounded by the calyx but not included in it.

Anthers 4-celled.

Perianth or calyx wholly persistent, pedicel of fruit not thickened	Machilus.
pedicel of fruit thickened	Phœbe.
Perianth-segments breaking off and leaving a 6 lobed or entire cup or disk under the fruit	Cinnamomum.
Perianth wholly deciduous	Alseodaphne.

Anthers 2-celled.

Perianth wholly deciduous, fruit naked on the fleshy thickened pedicel	Haasia.
Perianth-segments deciduous, fruit seated in the flattened base of the perianth	Beilschmiedia.
Perianth wholly persistent	Apollonias.

Tribe II, Cryptocaryeæ.—Flowers hermathrodite (rarely dicœcious) without an involucre or imbricated scales, in panicles racemes or spikes, the inner 3 stamens extrorse, staminodia 3 in the male flowers, fruit at length quite enclosed in the perianth. Cryptocarya.

Tribe III, Litsœaceæ.—Flowers dicœcious (rarely hermathrodite) in umbels or heads with a 4-6 leaved involucre or surrounded by closely imbricate scales, anthers all introrse or rarely the inner ones sub-extrorse, staminodia none in the male flowers (except occasionally in Tetranthera).

Anthers 4-celled.

Flowers in pedicellate involucres	Tetranthera.
Flowers in sessile clusters with imbricate scales or bracts at the base. Stamens 9 (rarely 6), fruit seated on the persistent cup-shaped base of the calyx	Actinodaphne.
Stamens 6, fruit seated on the flat scarcely dilated calyx tube, the segments persistent or deciduous	Litsœa.

SUB-ORDER Hernandiæ.—Anther valves opening laterally ..... Hernandia.

This order is most abundantly represented in our western moist forsets, particularly on the mountains, all the woods or sholas on which abound with members of this family. All the species are trees, always of considerable size, sometimes very large; very little is known of their timbers, but as far as I have seen, they are all of good average quality though none very superior. Three species only (two Tetrantheras and 1 Actinodaphne are found on the eastern side of the presidency, all the rest affecting the moister parts of the western side, Mysore, &c., and Ceylon; these number about 50 described species (even if all the varieties of Cinnamomum are considered as only 1 species), about 18 of which are perhaps confined to Ceylon. The genera are pretty easily distinguished, but the species, particularly those of Tetranthera, are very difficult to make out satisfactorily, and are at present involved in much perplexity. Copious specimens of each species, with fruit as well as flowers of both sexes, are essential, and these are often not procurable at one and the same time, and herbarium specimens are often sadly deficient. I have not therefore attempted to unravel the species of the genus Tetranthera in this work, and though I have several new species in that and other genera, I shall not attempt to describe them here. The genus Cinnamomum is abundantly represented from the sea level up to 8000 feet, and there are some 6 or 7 varieties the extremes of which are well marked, but I find that they run too much one into another, and after many attempts to keep up several species, and after an observation of the different species extending over many years, I am inclined to view them all as only varieties of Cinnamomum Zeylanicum (or the true cinnamon of commerce).

The Persæa gratissima, the Alligator or Avocado pear of the West Indies, is an introduced tree in gardens in this presidency, and the Cinnamomum camphora, or true camphor tree of China and Japan, has also been introduced on the Nilgiris.

Tetranthera monopetala, Roxb., and T. laurifolia, var. Roxburghii, have been introduced into our gardens (in the plains) from Bengal, but both I believe occur on our Eas tern Ghats and the latter in Tinnevelly.

The Sub-order *Cassytheæ* not coming within the scope of this work, yields leafless parasitical twiners (Cassytha.)

MACHILUS. Rumph.

For Gen. Char. see letter-press to Pl. cclxiv.

1. Machilus macrantha, *Nees.*—For description, &c. see Pl. cclxiv.

Five other species of this genus are found in Northern India.

PHŒBE. Nees.

For Gen. Char. see letter-press to Pl. ccxcii.

1. Phœbe Wightii, *DC.*—For description, &c. see Pl. ccxcii.

2. Phœbe lanceolata, *Nees.*—A middling sized or small tree, young shoots sericeous, leaves often somewhat verticelled chartaceous or submembranaceous, lanceolate or oblongo-lanceolate with a long fine acumination, generally much attenuated at the base, 3-9 inches long by 1-2½ broad, glabrous above in age, minutely hairy beneath and more or less glaucous, penniveined, the veins and costa rather prominent beneath, immersed above, petiole 3-10 lines long, corymbs axillary and terminal long peduncled but generally shorter than the leaves, slightly sericeous or subglabrous as is the inflorescence, stamens all hairy, fruit 7 lines long, calyx in fruit 3 lines long. *Nees. in DC. Prod.* xv. *p.* 34;—*Wight Icones. tab.* 1821. (not good). Wight's figure, 1819, of Apollonias Arnottii would answer well for this plant except that the anthers are 2-celled. My specimens correspond well with specimens from Assam, except that the corymbs are on longer peduncles in the latter.

A common tree in the Wynaad, Anamallays and Tinnevelly mountains at 3000 feet elevation; I am not acquainted with its timber.

CINNAMOMUM. Burm.

For Gen. Char. see letter-press to Pl. cclxii.

1. Cinnamomum Zeylanicum, *Breyn.*—For description, &c. see Pl. cclxii.

Meissner (in DeCandolle's Prodromus) describes 5 species of this genus as indigenous to Southern India, viz.: 1, C. Wightii; 2, sulphuratum; 3, Perottetii; 4, Zeylanicum; and 5, iners. Of Zeylanicum he makes 3 varieties, viz.: commune, inodorum and microphyllum; and of iners 2 varieties, trinerve and subvenosum, and from Ceylon he describes 4 additional species, viz.: multiflorum, litsœfolium, citriodorum and ovalifolium, and a 3rd variety of iners, viz. dubium. I am acquainted with all these supposed species, and though the varieties differ very much in the pubescence, and texture size and shape of the leaves (the latter varying from narrow linear and lanceolate to oblong or ovate) and in the length of the panicles, number of the flowers, &c., individuals are subject to much variation, and the forms run so one into another that it is impossible to lay hold of any permanent characters to distinguish them by, and I have long ago learnt to look upon them all as varieties of only 1 species. Sulphuratum, common in Wynaad, Coorg, western slopes of the Nilgiris, &c., is a curious form, with the leaves densely clothed on both sides with yellowish tomentum, but other forms approach this in their pubescence.

Of C. (camphora) cecidodaphne, *DC.*, a penniveined species said to be found in Malabar, I know nothing, and believe that it is not a South Indian species.

ALSEODAPHNE. Nees.

For Gen. Char. see letter-press to Pl. ccxcvii.

1. Alseodaphne semicarpifolia, *Nees.*—For description, &c. see Pl. ccxcvii.

HAASIA. Bl.

For Gen. Char. see letter-press to Pl. ccxcviii.

1. Haasia Wightii, *Nees.*—For description, &c. see Pl. ccxcviii.

2. Haasia oppositifolia, *Thw.*—A tree 50-60 feet high, glabrous, leaves coriaceous glabrous of the same color on both sides opposite oblong or oblongo-lanceolate, obtusely acuminate, the costa and veins prominent on both sides, veinlets much reticulated, narrowed at the base, 4-8 inches long by 1½-3 inches broad, petiole 4-8 lines long, panicles axillary or congested into a terminal corymb shorter than the leaves many-flowered, fruit oblong 8-9 lines long 3 lines broad, seated on the thickened truncate pedicel which is 1-2 lines in length. *DC. Prod* xv. *p.* 61. Apollonias Zeylanica, *Thw. En. Pl. Zey. p.* 253.

Ceylon, central provinces, up to 4000 feet elevation. Probably not distinct from No. 1.

BEILSCHMIEDIA. Nees.

For Gen. Char. see letter-press to Pl. cclxiii.

1. Beilschmiedia fagifolia, *Nees.*—For description, &c. see Pl. cclxiii.

Two other species inhabit Northern India.

APOLLONIAS. Nees.

For Gen. Char. see letter-press to Pl. ccxci.

1. Apollonias Arnottii, *Nees.*—For description, &c. see Pl. ccxci.

CRYPTOCARYA. R. Br.

For Gen. Char. see letter-press to Pl. ccxcix.

1. Cryptocarya Wightiana, *Thw.*—For description, &c. see Pl. ccxcix.

DeCandolle gives 2 other species as inhabiting the Peninsula, viz. Stocksii and Neilgherriensis, but I do not know these if distinct from C. Wightiana.

2. C. membranacea, *Thw.*—A middling sized tree, leaves oblong or rarely ovato-oblong, abruptly acuminate acute and a little oblique at the base, slightly paler beneath, subglabrous membranaceous, $2\frac{1}{2}$-7 inches long by 1-$2\frac{3}{4}$ inches broad, veinlets reticulated on both sides, petioles 3-4 lines long, panicles axillary short few-flowered slightly ferruginous, fruit oblongo-ovoid ecostate black-purple about 7 lines long. *Thw. En. Pl. Zey. p.* 254.

Ceylon, Saffragam district, up to 2000 feet elevation.

C. floribunda and amygdalina are species found in Northern India.

TETRANTHERA. Jacq.

For Gen. Char. see letter-press to Pl. ccxciii.

This genus, as now understood, includes Cylicodaphne of *Nees* and Lepidadenia, *Bl.*, which only differ in the perianth tube being more enlarged and more concave or cup shaped under the fruit than in the original Tetranthera.

Meissner (in DeCandolle's Prodromus) makes 24 species, besides varieties, as inhabiting South India and Ceylon, viz. :—

1.	Tetranthera tomentosa	
	var. glabrescens	Peninsula, India, and Ceylon.
2.	T. laurifolia	Canara.
	var. Roxburghii	
	var. citrifolia	Peninsula, India, and Ceylon
	var. platyphylla	Do.
3.	Tetranthera ligustrina	Canara.
	var. celastroides	Peninsula, India.
4.	T. velutina	Nilgiris and Ceylon.
5.	T. micrantha	Peninsula, India ?
6.	T. glauca	Do. ?
	var. elongata	
	var. lævigata	Do.
7.	T. lœta	Courtallum.
	var. glauca	Ceylon.
8.	T. venulosa	Peninsula, India.
9.	T. Wightii	Do.
10.	T. nervosa	Ceylon.
	var. coriacea	Do.
	var. chartacea	Do.
11.	Tetranthera longifolia	Do.
12.	T. Hookeriana	Do.
13.	T. oleoides	Peninsula, India. ?
14.	T. cordifolia	Do.
15.	T. Panamonja	Courtallum.
16.	T. glabrata	Dindigul Hills.
17.	T. (Cylicodaphne) Wightiana	Peninsula, India, and Ceylon.
	var. tomentosa	
	var. glabrescens.	
18.	T. (C.) Zeylanica	Ceylon.
19.	T. (C.) rigida	Do.
20.	T. (C.) sebifera	Nilgiris.
21.	T. (C.) oblonga.	
	var. Stocksii	Canara.

22.	T. (C.) Thwaitesii	Ceylon.
	var. ovalifolia	Do.
	var. parvifolia	Do.
	var. angustata	Do.
23.	T. (C.) Walkeri	Do.
24.	T. (C.) myristicæfolia	
	var. acutata	Canara.

I have a very large collection of specimens of this genus from all parts of this presidency and from Ceylon, but many of my specimens are incomplete, wanting fruit, or flowers of one or other sex, &c., and I have utterly failed at making a satisfactory determination of the limits of the species, so I will not here attempt a description of the different species, as it would only add to the confusion. I feel certain, however, that the 24 species enumerated above will have to be very considerably reduced. I have figured one of our commonest species, viz., T. Wightiana; this is a most variable species as to the size and shape of the leaves, amount of pubescence, number of the parts of the flower, &c., and I feel certain that T. zeylanica, T. rigida and T. floribunda may be included under it, and if I do not confound 2 species, it has also occasionally hermathrodite flowers, and T. sebifera, *Bl.* (Lepidadenia Wightiana, *Nees*; *Wight's Icones tab.* 1837) and perhaps T. myristicifolia and some others, may probably be only varieties. Staminodes are occasionally present in the male flowers though there were none in the particular tree figured, and I did not like to run the risk of mixing up two distinct species by figuring flowers from other specimens; the inner anthers are introrse subextrorse or almost extrorse.

ACTINODAPHNE. Nees.

For Gen. Char. see letter-press to Pl. ccxcv.

Actinodaphne angustifolia, *Nees.*—A large tree, branchlets lanate, leaves coriaceous in age, membranaceous when young in verticels of 5-7, from narrow lanceolate to obovate lanceolate obtusely acuminate densely sericeous or villous when young at length glabrous above, glaucous beneath and villous on the costa and veins, 4-9 inches or even more long by $1\frac{1}{4}$-3 broad, penniveined, petioles 6-10 lines long, umbels fascicled very shortly pedunculate sericeous, common peduncle 2-3 lines long or sub obsolete, partial pedicels 1-2 lines long elongating slightly in fruit, berry globose size of a pea. *Nees in DC. Prod.* xv. 214;—*Wight Icones* 1841.

A common tree in almost all our western moist jungles up to 4-5000 feet elevation, also in Bengal. I am not acquainted with its timber. Analysis of the male flowers are given in Pl. ccxcv.

2. Actinodaphne salicina, *DC.*—For description, &c. see Pl. ccxcv.

The tree here figured is the *var.* β. abbreviata, *DC. Prod.* xv. 212. *Var.* β has the leaves 5-6 inches long by 8-12 lines broad, and has many more primary veins. I have this latter only from the west slopes of the Nilgiris.

3. Actinodaphne stenophylla, *Thw.*—A tree 20-30 feet, branchlets puberulous, leaves 4-6 verticellate linear-lanceolate obtuse very minutely reticulate and pitted on the upper side, a little narrowed at the base, glabrous above in age, very glaucous beneath, 2-6 inches long by 3-10 lines broad, petioles 2-5 lines long, fascicles aureo-pubescent 4-8 flowered, pedicels equalling the calyx, calyx $1\frac{1}{2}$ lines long, lobes 6 deciduous, berry globose 3 lines in diameter. *Thw. En. Pl. Zey. p.* 256;—*DC. Prod.* xv. *p.* 212.

Ceylon, in the Oovah and Badulla districts up to 3000 feet elevation.

4. Actinodaphne elegans, *Thw.*—A small tree, branchlets and petioles sparingly hairy with longish brown hairs, leaves 3-5 verticellate, linear lanceolate to elliptic, generally with a very long gradual fine acumination, glabrous or subglabrous in age, minutely reticulated and pitted, very glaucous beneath, $2\frac{1}{2}$-6 inches long by 1-$1\frac{1}{2}$ inches broad, petioles 3 5 lines long, inflorescence and fruit exactly as in A. stenophylla. *Thw. En. Pl. Zey. p.* 256.

Ceylon, central provinces and in the Pasdoon corle up to an elevation of 3000 feet. These 3 last species are very closely allied, and may be only varieties of one plant; elegans is more glaucous beneath, but is scarcely distinguishable in the shape of the leaf from salicina var. α, but the pubescence on the young ramuli is different from both that and stenophylla, though the pubescence of salicina β. abbreviata is nearly the same. DeCandolle describes an A. Thwaitesii, which I have not seen, but it is made up from specimens referred by Thwaites to elegans and stenophylla.

5. Actinodaphne glauca, *Nees.*—A tree 20-30 feet high, young branches and petioles fusco-tomentose, leaves 5-7 verticellate rigid coriaceous elliptic or obovato-oblong obtuse or rounded at the apex, minutely scrobiculato reticulate, glabrous and glaucous, the young ones hoary beneath, 2-$2\frac{1}{2}$ inches long by 12-14 lines broad, primary veins 8-10 on each side rather prominent, petioles 6-7 lines long, peduncles 2-3 lines long, calyx 6-parted 3-4 lines in diameter in expansion (stamens in the male and staminodes in the female, &c., as in salicina fig. ccxcv.), fruit subspherical seated in the crenulated cup-like base of the calyx. *DC. Prod.* xv. 213.

Ceylon, on the Pedrotalagalle 7000-8000 feet elevation.

6. Actinodaphne molochina, *Nees.*—A small tree, young branches ferruginous, leaves 5-6-verticelled rigid coriaceous oval obovate, oblong or nearly orbicular obtuse or rarely acute, above glabrous and shining, beneath rufo-tomentose, 2-$3\frac{1}{2}$ inches long by 1-2 inches broad, penniveined, the primary veins 5-7 on each side prominent on both sides, petiole thick 2-3 lines long, flowers fascicled in small sessile dense rufo-sericeous heads as in the preceding species. *DC. Prod.* xv. 211;—*Wight Icones* 1843. A. molochina and Moonii, *Thw. En. Pl. Zey.* 257-256.

Var. α. glabrescens, leaves sub-rotundo-oval oblong or lanceolate penniveined, at length subglabrous and glaucous beneath.—A. Moonii, *Thw.*

Var. β. subtriplinervia, leaves subrotund or obovate, obtuse, penniveined, but occasionally spuriously 3-nerved—A. molochina, *Thw.*

Ceylon, *var.* α. central provinces, 5000-7000 feet elevation.

var. β. Pedrotalagalle, 6000–8000 feet elevation.

7. ACTINODAPHNE SPECIOSA, *Nees.*—A showy tree, 30-40 feet high, young branches and young leaves very densely rufo-lanate, leaves 3-4 verticellate very rigid coriaceous ovate to lanceolate, shortly acuminate or obtuse, in age glabrous bullate and shining above, glaucous and villous beneath, penniveined or rarely subtriplinerved, primary veins 4-5 on each side and with the reticulated veinlets impressed above much raised beneath, 4-10 inches long and up to 8 inches broad, petioles 10-14 lines long, flowers fascicled in small sessile dense villous heads as in the preceding species. *Nees.*;—*DC. Prod.* xv. 219.

Var. β. leaves less coriaceous, sparingly hirsute, ovato or oblongo-lanceolate acuminate acute at the base, 3-6 inches long by 2-4 inches broad.—A Candolleana, *DC. Prod.* xv. 219.

Ceylon, central provinces, up to 8000 feet; *var.* β. at 4000 feet elevation.

DC. considers the latter a distinct species.

8. ACTINODAPHNE HOOKERI, *DC.*—For description, &c. see Pl. ccxcvi.

I know nothing of A. lanata described in *DC. Prod.* xv. 219 as a Nilgiri and Ceylon tree, and it is not mentioned by Thwaites in his *Enumeration.*

I have a fine new species from the South Canara ghats, a lofty tree called Nettee, but my specimens are too imperfect for description.

LITSŒA. JUSS.

For Gen. Char. see letter-press to Pl. ccxciv.

1. LITSŒA ZEYLANICA, *Nees.*—For description, &c. see Pl. ccxciv.

L. foliosa, *Nees*, oblonga, *Nees*, scrobiculata, *Nees*, and other species have already been joined with this, and after a careful study and dissection of orbicularis, *Thw*, fuscata, *Thw*, and ambigua, *Meissner*, I cannot satisfactorily distinguish these species, and believe them to be all varieties of Zeylanica. Orbicularis, which form I also have from the Peninsula, only differs in its leaves being nearly orbicular, and fuscata only differs in being furnished with pubescence; these 2 may rank as varieties distinguished by these peculiarities, but I can find nothing to distinguish ambigua.

HERNANDIA. PLUM.

For Gen. Char. see letter-press to Pl. ccc.

1. HERNANDIA PELTATA, *DC.*—For description, &c. see Pl. ccc.

In Northern India the genera Nothaphœbe, Endiandra, Dodecadenia and Polyadenia are each represented by one tree; the genus Lindera has 5 species, Apenda 2, and Daphnidium 6; and in Birmah the genus Dictyodaphne yields 1 species. None of these 8 genera are represented in Southern India.

ORDER LXIX—EUPHORBIACEÆ.

Flowers always unisexual, either without a perianth in one or both sexes, or more frequently with a simple calyx-like perianth, or sometimes also with 4 or 5 petals alternating with the calyx-lobes. Stamens various. Ovary consisting of 3 or sometimes 2 or more than 3 united 1-celled or rarely 2-celled carpels, each with 1 or 2 generally pendulous ovules. Styles as many as carpels, free or more or less united, entire or divided, the stigmatic surface usually lining their inner face. Fruit either capsular, separating into as many elastically 2-valved cocci as carpels, leaving a persistent axis, or succulent and indehiscent, the endocarp consisting of as many indehiscent nuts or cocci as carpels. Seed laterally attached at or above the middle, with or without an arillus. Embryo straight, with flat cotyledons and a superior radicle in a fleshy albumen, or very rarely the cotyledons fleshy, and little or no albumen. Trees, shrubs, or herbs, often abounding in acrid milky juice. Leaves alternate or opposite, rarely divided or compound, usually with stipules. Inflorescence very varied. Flowers usually small.

Tribe I, Phyllantheæ.—Ovary cells 2-ovuled, segments of the calyx in the male flower imbricate.

Tribe II, Briedelieæ.—Ovary cells 2-ovuled, segments of the calyx in the male flowers valvate.

Tribe III, Crotoneæ.—Ovary cells 1-ovuled, anthers incurved in the bud.

Tribe IV, Acalypheæ.—Ovary cells 1-ovuled, anthers erect in the bud. Segments of the calyx in the male flower valvate, involucre when present unisexual.

Tribe V, Hippomaneæ.—Ovary cells 1-ovuled, anthers erect in the bud. Segments of the calyx in the male flower imbricate, involucre when present unisexual.

Tribe VI, Euphorbieæ.—Ovary cells 1-ovuled, anthers erect in the bud, segments of the male calyx imbricate (generally obsolete), flowers (monandrous) involucrate, involucre bisexual.

Tribe I, PHYLLANTHEÆ.

Monœcious or occasionally dioœcious (in Actephila).
- Flowers petalous ... ... ACTEPHILA.
- Flowers apetalous.
  - Stamens central.
    - Disk present ... ... PHYLLANTHUS.
    - Disk none.
      - Male perianth-lobes not inflected ... . GLOCHIDION.
      - Male perianth-lobes inflected, seed arillate ... ... MELANTHESOPSIS.
      - Male perianth-lobes inflected, seed exarillate ... ... BREYNIA.

Dioœcious.
- Stamens central, fruit a drupe... ... ... PUTRANJIVA.
- Stamens not central.
  - Male flowers not in catkins.
    - Stamens inserted round the rudiment of an ovary.
      - Leaves simple.
        - Fruit a dry capsule.
          - Leaves alternate... ... ... SECURINEGA.
          - Leaves verticelled or opposite ... . MISCHODON.
        - Fruit fleshy baccate... ... ... BACCAUREA.
      - Leaves trifoliate ... ... BISCHOFFIA.
    - Stamens inserted round a central disk, rudiment of ovary none or very small.
      - Ovary 1-celled ... ... HEMICYCLIA.
      - Ovary 2-4 celled... ... ... CYCLOSTEMON.
  - Male flowers in catkins.
    - Ovary 2-celled, styles or stigmas 2 ... ... APOROSA.
    - Ovary 1-celled, styles or stigmas 3-4 ... ... ANTIDESMA.

Tribe II, BRIEDELIEÆ.

- Fruit not capsular ... ... BRIEDELIA.
- Fruit a capsule.
  - Seed impressed at the hilum, cotyledons thin folded ... ... CLEISTANTHUS.
  - Seed not impressed at the hilum, cotyledons thick, not folded ... ... LEBIDIEROPSIS.

Tribe III, CROTONEÆ. ... ... CROTON.

Tribe IV, ACALYPHEÆ.

Petalous.
- Male calyx-segments valvate but bursting irregularly ... ... ALEURITES.
- Male calyx-segments regularly valvate
  - Petals of the male twice as many as the sepals ... ... AGROSTISTACHYS.
  - Petals of the male equal in number to the sepals ... ... SARCOCLINIUM.

Apetalous.
- Stamens inserted round a broad central disk ... ... CŒLODISCUS.
- Stamens inserted round the rudiment of an ovary.
  - Anthers attached by the middle of the back, cells adnate ... . CEPHALOCROTON.
  - Anthers pendulous, cells distinct .. .. CŒLODEPAS.
  - Anthers attached by the base, cells adnate ... ... SYMPHYLLIA.
- Stamens central, not polyadelpous.
  - Anthers 2-celled.
    - Fruit fleshy indehiscent, stamens mixed with glands ... ... PODADENIA.
    - Fruit a drupe with 3-4 hard cocci, stamens without glands ... ... TREWIA.
    - Fruit capsular ... ... MALLOTUS.
  - Anthers 4-3 celled.
    - Connective produced ... ... CLEIDION.
    - Connective not produced ... ... MACARANGA.
- Stamens central polyadelphous, no rudiment of ovary, female calyx imbricate, seed not carunculate ... ... HOMONOYA.

Tribe V, HIPPOMANEÆ.

Petalous.
- Stamens central.
  - Fruit a drupe with a hard 1 seeded nut... ... . GIVOTIA.
  - Fruit a capsule
    - Receptacle in the male flower not elevated,
      - Seed not carunculate ... ... TRIGONOSTEMON.
      - Seed carunculate ... ... JATROPHA.
    - Receptacle in the male flower elevated.
      - Dioœcious, both sexes with petals, seed ecarunculate ... ... OSTODES.
      - Monœcious, female flowers often apetalous, seed carunculate .. CODIŒUM.

Apetalous.
- Stamens inserted round the rudiment of an ovary ... . CHŒTOCARPUS.
- Stamens central.
  - Stamens numerous .. .. GELONIUM.
  - Stamens 2-3 .. .. EXŒCARIA.

Tribe VI, EUPHORBIEÆ... ... ... EUPHORBIA.

Genera allied to EUPHORBIACEÆ ... ... DAPHNIPHYLLUM, SARCOCOCCA.

This is a very large order, and of much importance in a forest view, most of the genera yielding large trees ; very little is known of the timber of many of its representatives. The following trees are known to yield very valuable timber. Phyllanthus emblica, Putranjiva Roxburghii, Bischoffia Javanica, Briedelia retusa, Hemicyclia elata, and Mischodon Zeylanicus ; the 4 first of these are very common and widely distributed throughout the whole of this Presidency ; the fifth is, I believe, confined to our Western Ghats and the sixth to Ceylon. Mallotus Philippinensis is valuable on account of the dye powder yielded by its capsules. Some genera yield soft worthless timbers, such as Trewia, Macaranga, Givotia.

The genus Glochidion is a very large one, and is represented by trees from the sea level up to the tops of our highest mountains. Daphniphyllum and Sarcococca are also found up at 6000 and 8000 feet elevation, and Actephila and Excæcaria at 5-6000, but the others are rarely seen much above 4000 or 4500, though Sarcoclinium and Phyllanthus emblica, Cephalocroton Indicum, and one or two species of Aporosa and Antidesma occasionally come up to 5000 or rather higher.

Our moist Western Ghat forests up to 4000 feet abound with Actephila, Baccaurea, Cyclostemon, Aporosa, Agrostistachys, Sarcoclinium, Cælodepas, Cephalocroton, Cleidion, Trigonostemon, Ostodes, Codiœum, Excæcaria, Glochidion, Hemicyclia, Antidesma, Croton and Mallotus, the first twelve of which are genera confined to our moister forests, but the last six genera are represented all over the presidency. The genera Melanthesopsis, Breynia, Putranjiva, Securinega, Briedelia, Cleistanthus, Lebidieropsis, Trewia, Macaranga, Homonoya, Givotia, Gelonium and Euphorbia affect our drier forests on both sides of the presidency, and are seldom to be seen in the moister or evergreen tracts of the west side.

The genera Cœlodiscus, Podadenia, Chœtocarpus and Mischodon are as far as we yet know confined to Ceylon. Melanthesopsis has not been figured as it only differs from Breynia in the seed being arillate, and Cœlodiscus and Symphyllia are quite unknown to me.

Of genera yielding undershrubs or herbaceous plants only, and not coming within the scope of this work, there are in Phyllanthæ, Agyneia and Sauropus ; in Acalypheæ, Acalypha, Crozophora, Tragia and Claoxylon ; in Hippomaneæ, Jatropha, Baliospermum and Sebastiania. The genus *Ricinus* (Castor-oil plant) near Homonoya in Acalypheæ, is an introduced plant in this presidency ; it is largely cultivated, and has run quite wild in waste places, &c. Jatropha curcas, a common hedge plant, is an introduction from Tropical America.

Phyllanthus is a very large genus, and the following genera are now only considered as sections or subgenera of it. Chorizandra, *Wight*, Peltandra, *Wight*, Kirganelia, *Juss*, Cicca, *Linn.*, Prosorus, *Dalz.*, Eriococcus, *Hassk.*, (Reidia, *Wight.*) Most of the species are small undershrubs or herbs and are not described in this work.

Only 7 genera occur in N. India and Birmah, which are not represented in the Peninsula. In Phyllantheæ, *Andrachne* yields one shrub in North India and *Hymenocardia* one tree in Birmah. In Acalypheæ, *Sumbavia* and *Coccoceras* each yield 1 small tree in Birmah, *Alchornea* 2 small trees or shrubs in North India and 1 in Birmah, and *Cnesmone* 1 shrub in North India. In Hippomaneæ, *Microdesmis* yields a shrub in Birmah.

I have followed J. Müller's excellent new arrangement of the order in every particular, except that I have kept up Glochidion as a genus instead of amalgamating it with Phyllanthus, and I have removed Mischodon, which is a 2-ovuled genus, from Hippomaneæ to Phyllantheæ.

Moacurra gelonioides, *Roxb.*, is referred by Müller to the tribe Phyllantheæ. I have followed Hooker and Bentham in placing it under the genus Chailletia in the order Chailletiaceæ.

TRIBE I.—PHYLLANTHEÆ.

ACTEPHILA. BLUME.

Calyx 5-6-lobed imbricate, petals as many alternate with the calyx-segments, disk 5-6 lobed, the lobes opposite the calyx-segments. *Male* stamens 5-6 inserted round the rudiment of an ovary, the receptacle not raised, connate below or free, anther-cells divaricate extrorse, rudiment of ovary 3-cleft each division bifid. *Female* staminodes none, ovary 3-celled, cells 2-ovuled, styles 3 each bifid, fruit a capsule, 3-coccous, shells 2-valved, cocci with 1-2 seeds in each, seeds exarillate, exalbuminous, radicle minute, cotyledons thick unequal. Trees or shrubs, leaves alternate simple penniveined entire glabrous, stipules deciduous, flowers monœcious or dicœcious axillary, the males short peduncled crowded, the females solitary and on longish peduncles. *Bl. Bijdr. p.* 581. Anomospermum, *Dalz. in Hook. Journ. of Bot.* 1851, 228. Savia, *Baillon.*

1. ACTEPHILA EXCELSA, *Dalz.*—A small tree or large shrub, monœcious or occasionally dicœcious, leaves from narrow lanceolate-elliptic to oblongo-elliptic or more or less obovate, acute at both ends sometimes acuminate at the apex, entire coriaceous or subcoriaceous shining glabrous paler beneath, 3½-8 inches long by 1-2½ broad, venation penniveined with large marginal loops, petioles 3-18 lines long, stipules squamæform acuminate from a broad base glabrous or hairy, male flowers crowded in the axils subsessile, female larger and on longish (8-10 lines) peduncles, generally solitary in the axils with the males or in separate axils in the same plant, or male and females on separate plants ; calyx-lobes rounded glabrous or hairy, petals lanceolate or obovate very much smaller than the calyx-lobes, styles 3-bifid or rarely subhexagynous, capsule glabrous about 1 inch in diameter depressed globose. *Dalz. l. c.* Actephila Neil-

gherrensis, *Wight Icones tab.* 1910 ;—*Thw. En. Pl. Zey. p.* 280. A. excelsa and Zeylanica, *DC. Prod* xv., *Sec. post p.* 222 *and* 221. Savia Zeylanica *Baillon.*

Common in our moist Ghat forests from Canara down to Cape Comorin up to 5500 feet, also in Ceylon, Sylhet and Khasya ; a very variable plant, sometimes a tree, often only a small shrub. My South Tinnevelly specimens have very much narrrower leaves than the Nilgiri and Malabar forms.

Analysis, Pl. XXIII, fig. 3.

1. Portion of a branch with only male flowers in the axils, leaves removed (life size).
2. A male flower-bud, sepals imbricate hairy.
3. A full male flower, stamens 5 connate below round the abortive ovary, 5 small petals.
4, 5. Stamens, front and back view.
6. A segment of the calyx.
7. A petal.
8. Apex of the abortive style.
9. Branch with female inflorescence (life size.)
10. Female flower, sepals imbricate, hairy.
11. A full female flower, styles 3 each 2-cleft with blunt stigmas (in some flowers I found the styles divided to the base, *i. e.*, hexagynous.)
12. Ovary cut vertically, ovules pendulous from near the apex of the axis.
13. Ovary cut transversely, 3 cells, each 2-ovuled.
14. A valve of the capsule, shell double.
15. A seed. (Drawn from living specimens collected on the western slopes of the Nilgiris at 3500 feet elevation ; the specimens figured were dicœcious, it is more commonly monœcious ; one female flower in each axis with the males.)

2. Actephila Thomsonii, *Müll.*—A small tree or large shrub, dicœcious, leaves rhomboid-obovate obtusely cuspidato-acuminate, cuneate and narrowed at the base, calyx-segments of the female linear-lanceolate acute furnished at the base inside with a row of glands, petals linear-lanceolate rigid entire nearly 3 times shorter than the calyx, peduncle of the female slender elongate 3-flowered. *DC. Prod.* xv. 222.

Mysore and Carnatic. This species is unknown to me ; it differs from the last in its 3-flowered female peduncles and in the calyx.

PHYLLANTHUS. Linn.

For Gen. Char. see letter-press to Pl. cclviii.

* *Anthers* 5.

Anther-slits vertical, filaments unequally connate, the 2 *exterior nearly free.* Sec. Kirganelia.

1. Phyllanthus reticulatus, *Poir.*—A large straggling shrub, branches slender, the younger ones slightly pubescent or quite glabrous, leaves alternate distichous oval ovate or elliptic entire, ½ to 1½ inches long by 4-5 lines broad, petioles 1-2 lines long, flowers axillary aggregated several males and usually 1 female, calyx 5-cleft, disk of 5 glands, filaments 3 unequal the centre one erect and 3-androus the 2 lateral ones filiform oblique and each bearing 1 anther. Stigmas minute equal in number to the cells of the ovary, berry depressed umbilicate dark purple succulent 6-12 celled. *Poir. Dict. Encycl.* 5 *p.* 298 ;—*DC. Prod.* xv. 344. Anisonema multiflora, *Wight Icones* 1899. Phyllanthus multiflorus, *Willd.* Kirganelia multiflora, *Baillon.* Phyllanthus, *Roxb. Flora Ind.* iii. 664.

This shrub is common throughout the plains of India and Ceylon, in hedges, banks of water courses, waste places, &c ; it is also found in the Philippines and in Africa. In Ceylon it is called Welkyla. Its root is medicinal and sold in our bazaars ; the bark yields a reddish brown dye.

* * *Anthers* 2-4.

Male calyx 5-6 *parted.* Sec. Phyllanthus.

2. Phyllanthus emblica, *L.*—For description, &c. see Pl. cclviii.

3. Phyllanthus polyphyllus, *Willd.*—A small tree or large shrub, stipules triangular lanceolate, leaves linear obtuse mucronate densely approximated, margins recurved, glabrous, 3-6 lines long by about 2 lines broad, flowers fascicled, the male very short pedicelled the female longer, the disk in the male of 5 distinct glands, in the female annular, ovary globose, the column of styles slender, styles thin elongated bifid, capsule dry about the size of a pea trisulcate. *Willd. Sp. Pl.* iv. 586 ;—*DC. Prod.* xv. 352 ;—*Wight Icones tab.* 1895. ii. P. taxifolius, *Don. Prod. Fl. Nep. p.* 63. P. emblicoides, *DC. l. c.* 353. P. Lawii, *DC. l. c.* 353.

Common about the foot of the Nilgiris, and all along the west side of the Presidency, Mysore, &c. and in Ceylon. It has much the appearance of P. emblica, but the small dry fruit at once distinguishes it.

4. Phyllanthus juniperinoides, *Müll.*—A large glabrous shrub, floriferous branchlets very small 3-5 fascicled from the axils of a pair of black spines on the main stem, leaves about 3 lines long by 1 line broad, oblongo ovate mucronate or acuminate subcordate at the base, stipules linear lanceolate from a broad base subscariose twice as long as the petioles, flowers subsolitary in the axils shortly pedicelled, disk in the male of 5 glands, in the female annular and 6-lobed, staminal column entire, anthers oblong apiculate,

ovary glabrous, styles 3 distinct erect bifid the branches compressed reflexed, capsule subglobose very small 2-3 lines in diameter. *DC. Prod.* xv. *p.* 358. P. spinulosus, *Wall. Cat.*

Common in beds of rivers in Wynaad and Coorg, also in the Concan ; well distinguished by the hard thorny protuberances on the main stems, in the axils of which the small floriferous branchlets (looking much like pinnate leaves) are fascicled.

Male calyx 4-*parted.* Sec. Cicca.

§ *Flowers monœcious fruit a drupe.* Sub. Sec. Eucicca.

5. Phyllanthus distichus, *Linn.*—An elegant small tree, branchlets approximated numerous scattered round the extremities of the branches 1-2 feet long, leaves numerous alternate short petiolate the largest about the middle of the branchlets the lowermost nearly orbicular gradually lengthening to oblong smooth entire waved rather glaucous beneath, 1-3 inches long by 1-1½ inches broad, sometimes there are male flowers in the axils of the upper leaves. Stipules minute, flowers very numerous small reddish collected in globular heads at the old axils after the leaves have fallen, male female and hermathrodite mixed, but the male much the most numerous, calyx of 4 orbicular concave spreading segments, disk of 4 glands, filaments 4 erect shorter than the calyx, ovary ovate, style scarcely any, stigmas 3-4 spreading 2-cleft, drupe fleshy 3-4 lobed 6-8 grooved, as large as a gooseberry.—Cicca disticha, *L. Mant. p.* 124. Phyllanthus longifolius, *Roxb. Fl. Ind.* iii. 672.

This tree is common in gardens and about waste places near villages, &c., but I never saw it in our forests ; its fruit is eaten raw, pickled, and preserved, the root is purgative. The tree is called Herfaroori in Hindustani and Aruuelli in Tamil ; when the lateral short flowering branchlets are leafless they look quite like racemes.

§ *Flowers diœcious, fruit a dry capsule.* Sub. Sec. Prosorus.

6. Phyllanthus Indicus, *Dalz*—A small tree, diœcious, leaves penniviened entire oblongo-elliptic elliptic-lanceolate membranaceous, 2-4½ inches long by 1-2 broad, petioles 2-5 lines long, stipules broad lanceolate obtuse subcoriaceous 1½-2 lines long ; male flowers very numerous fascicled 1½ lines broad, disk convex or flat, pedicels 3-4 lines long, female flowers in threes, pairs or solitary, pedicels 4-5 lines long, styles 3 long flat reflexed bifid at the apex. Capsule subglobose depressed 5 lines in diameter, seed shining purplish-blue. *Dalz. in Hook. Journ. of Bot.* iv. 346 ;—*DC. Prod.* xv. 417.

Coorg (Samàjee ghat), Wynaad, and elsewhere in our moist western forests up to 3000 feet, also on the Bombay ghats and in Ceylon ; the timber is white and tough and used for building purposes.

Analysis, Pl. XXIV, fig. 6.

(Under the subsectional name of Prosorus).

1. Portion of a branch shewing male inflorescence.
2. A male flower bud, sepals 4 imbricate.
3. A full male flower, disk 4-lobed slightly convex, stamens central 4.
4 & 5. Anthers, front and back view.
6. Female inflorescence, the pedicels are here solitary in the bracts ; they are often twin or tern.
7. A female flower, 4 sepals, disk, ovary and 3 distinct flat recurved styles.
8. Ovary cut vertically, ovules sub-pendulous.
9. Ovary cut transversely, 3-cells each 2-ovuled.
10. A fruit.

7. Phyllanthus cyanospermus, *Gærtn.*—A small tree, leaves somewhat rhomboidio-elliptic, male flowers 3 lines in diameter, disk concave adnate with the tube of the calyx, pedicels 4-5 lines long, female flowers always solitary, pedicels 5-8 lines long ; the rest as in Indicus.—Croton ? cyanospermum, *Gærtn. de Fruct. vol.* ii. *p.* 120 *t.* 107. Prosorus, *Thw. En. Pl. Zey. p.* 281. Phyllanthus, *DC. Prod.* xv. 417.

This is very closely allied to the last but can be distinguished by its male flowers being double as large. The female flowers in *Indicus* are generally in threes, but sometimes solitary as in this species. I hardly think that the 2 are more than varieties. DeCandolle describes a third supposed species of this section from the Bombay ghats, under the name of P. Stocksii, which he says is intermediate between Indicus and cyanospermus ; the description of this would answer well for some of my specimens of Indicus.

GLOCHIDION. Forst.

For Gen. Char. see letter-press to Pl. cclxxvii.

Sec. 1. Euglochidion.—*Calyx segments* 6-5 *equal, or more or less unequal : stamens generally* 5-(*rarely* 4-8), *ovary* 15-4 *celled.*

§ 1. *Style-column distinctly conical narrowed above.*

A. Ovary-cells 12-10.

1. Glochidion littorale, *Bl.*—A small tree, branches glabrous, leaves orbicular or ovato-elliptic or broadly obovate, obtusely rounded acutish at the base, submembranaceous, beneath brownish glabrous, male pedicels short, female flowers subsessile, male calyx and pedicels glabrous, the inner segments shorter oblongo-elliptic obtuse, anthers 5-6, segments of female calyx broadly elliptic obtuse glabrous, ovary 12-10 celled subpubescent. Column of styles shortly conical from a broad base not quite as long as the ovary

12-10 sulcate glabrous; stigmas emarginato-retuse at the apex, capsule a little depressed, slightly many-sulcate, puberulous at the apex *Bl. Bidj. p.* 585. Phyllanthus littoralis, *DC. Prod.* xv. 280.

Malabar, near the coast.

B. Ovary-cells 8-5.

a. Ovary glabrous.

2. Glochidion Zeylanicum, *Juss.*—A small tree, branchlets glabrous or subglabrous, stipules triangular ovate acuminate rigid recurved persistent, leaves oblongo-elliptic obtuse or shortly acuminate often slightly cordate at the base, 3-6 inches long by 2 inches broad, primary veins 10 on each side; flowers rather numerous in the axils of the leaves, fascicles often shortly peduncled and supra-axillary, segments of the male calyx broad ovate obtuse, one of the inner ones sometimes furnished with 2 auricles at the base, stamens 5-6, segments of the female calyx subrotund or broadly ovate obtusely rounded, ovary 7-4 celled globose glabrous, column of styles conical at length equalling the ovary in length, 7-4 lobed at the apex, lobes emarginate. Capsule ovoid-globose slightly depressed scarcely sulcate. *Ad. Juss. Tent. Euph. p.* 107. Phyllanthus Zeylanicus, *DC. Prod.* xv. 281. Bradleia, *Gærtn. de Fruct.* ii. *p.* 12.

South Canara, Ceylon, up to 2000 feet elevation.

3. Glochidion nitidum, *Roxb.*—A small tree, trunk erect with a large shady head, ramuli glabrous, leaves subsessile oblongo-ovate acute unequal at the base glabrous, shining above pale beneath, brownish green, 4-8 inches long, stipules small acute, inflorescence very shortly pedunculate a little above the axils, male and female flowers mixed, the former few and larger pedicelled, the latter numerous, calyx-segments 6 ovate acute, anthers 5-7, ovary 5-6 celled glabrous, style-column conical truncate the apex 5-6-fid, lobes emarginato-bilobulate, capsule depresso-globose, 10-12 sulcate.—Bradleia nitida, *Roxb. Fl. Ind.* iii. 699.

Canara and Malabar, and also on our Eastern Circar mountains and in the Bombay Presidency.

β. Ovary sericeous.

4. Glochidion lanceolarium, *Roxb.*—A small or middling sized tree, glabrous, ramuli triangular above, leaves short petioled elliptico-lanceolate or oblongo-elliptic, acute at both ends, rigid shining, 3-6 inches long by 1-2 inches broad, veins not conspicuous, male flowers fasciculate long peduncled, female glomerate sessile, male calyx-segments 6 lanceolate subacute and narrowed at the base, anthers 4-6, female calyx-segments oblongo-ovate the inner ones smaller. Ovary 8-6-celled subglobose sericeous, style-column conical truncate a little longer than the ovary 8-6 toothed at the apex, capsule subglobose depressed turnip shaped sulcate. —Bradleia lanceolaria, *Roxb. Fl. Ind.* iii. *p.* 697. Phyllanthus, *DC. Prod.* xv. 282. Glochisandra acuminata, *Wight Icones* 1905.

Malabar, Canara, also in the Bengal and Bombay presidencies; the wood is hard and durable, the tree is called Bhoma on the Bombay ghats.

C. Ovary-cells 5-4.

5. Glochidion tomentosum, *Müll.*—A large shrub or small tree, ramuli obscurely fusco-pubescent, leaves ovate or elliptic acute slightly cordate at the base, sparingly pubescent above tomentose beneath, 2-4 inches long by $1\frac{1}{4}$-2 inches broad, flowers fasciculate, pedicels 2-3 times as long as petioles subtomentose, female calyx 4-6 partite, exterior segments broadly ovate, interior narrow elliptic. Stamens 5, ovary 5-4 celled sericeo-tomentose 6-angled at the base, column of styles conical short thick about as long as the ovary 5-4 lobed at the apex and there sericeo-tomentose. *DC. Prod.* xv. 283.

Malabar, Concan and South Canara (Sampajee ghat).

§ *Style-column cylindric in its whole length, much narrower at its base than the apex of the ovary, and not distinctly broader upwards. Ovary* 6-5 *celled glabrous.*

6. Glochidion Canarum, *Müll.*—A small tree or large shrub, young branchlets 3-angled glabrous, stipules much recurved persistent, leaves glabrous oblongo-obovate, or oblongo-ovate or oblongo-elliptic, acute obtuse or slightly cordate at the base or subacute, pale above beneath brownish, primary veins 6-8 on each side, flowers fascicled, stamens 4, female calyx 4-6-parted gradually running into the pedicel, segments oblongo-ovate rather unequal truncato-obtuse or subacute, ovary 5-6 celled glabrous, style-column cylindric rather slender 6-cleft at the apex much narrower and nearly twice as long as the ovary, capsule nearly 4 lines broad globose depressed at the apex and base scarcely sulcate, rostrate with the persistent style-column.

South Canara and Mysore.

Sec. II. Hemiglochidion.— *Calyx* 6-5-*parted, stamens* 3, *ovary* 7-3-*celled.*

§ 1. *Style-column depresso-or deplanato-ovoid, about as broad or broader and often shorter than the ovary, not constricted at the base*

* *Calyx of female* 6-*toothed, ovary glabrous.*

7. Glochidion brachylobum, *Müll.*—A small tree, rigid very glabrous, branchlets angled. Stipules coriaceous broad obliquely triangular-ovate acute 3 times shorter than the petioles, leaves ovate or obovate or broad-elliptic obtusely acuminate unequal sided at the base, glabrous rigid and thick, about 4-5 inches long by 2-$2\frac{1}{4}$ inches broad, petioles about 4 lines long rigid. Male and female

flowers mixed, the former long the latter short-pedicelled, male calyx 6-parted glabrous, the connective elongate, female rather irregularly 6-lobed obovoid adpressedly pubescent, ovary 3-celled depresso-obovoid glabrous, style-column thick broad obovoid 8-sulcate nearly twice as long and broad as the ovary, glabrous, capsule 4-4½ lines broad subglobose, and a little depressed 3-coccous, 6-sulcate.—Phyllanthus brachylobus, *DC. Prod.* xv. 288. G. coriaceum in part (*c. p.* 3016), *Thw. En. Pl. Zey. p.* 285.

Ceylon, central provinces, 3-4000 feet elevation.

8. Glochidion Hohenackeri, *Mull.*—A tree, quite glabrous, leaves 2-3½ inches long by 7-8 lines broad, ovate lanceolate acuminate or subcuspidate, rather rigid more or less shining above, male flowers pedicelled, female sessile, calyx of the female 4-toothed, ovary depresso-globose 4-celled glabrous, style column much depressed thick a little broader and shorter than the ovary, deeply cruciately 4-cleft, male pedicels 2½ lines long, 2-3 times longer than the petioles, male calyx 6-parted, segments oblongo-elliptic obtuse, capsule 2½ lines broad 2 lines long, depressed 4-coccous, 8-sulcate, crowned by the style-column.

Malabar, South Canara and Concan.

* * *Calyx of female* 6-5 *cleft, ovary glabrous.*

9. Glochidion fagifolium, *Mull.*—A tree, male flowers pedicelled, female sessile, female calyx 6-fid, segments triangularly ovate, male oblongo-ovate, ovary globose 4-6 celled glabrous, style-column grey depressed thick a little broader and scarcely shorter than the ovary, radiately 4-6 cleft at the apex, glabrous in all its parts except the female calyx, branchlets angled, petioles 1½ lines long, stipules oblongo-ovate rigid, margins recurved, leaves about 4 inches long by 1-1¼ inches broad, oblongo or lanceolato-ovate or ovato-lanceolate acuminate, acute at the base, ashy green above, brownish beneath, somewhat unequal sided, male pedicels at first 2 lines at length 4 lines long, female scarcely any, male calyx obovate 1 line long, female calyx puberulous 3-8 glomerate in the axils.—Phyllanthus fagifolius, *DC. Prod.* xv. 288.

Nilgiris, also in Tenasserim and Chittagong.

§ 2. *Style-column short or long-conical, i. e., narrowed above, more or less broader at the base, and there not much constricted.*

1. *Column about as long or twice as long as the ovary.*

* *Ovary* 4-3-*celled, hairy.*

10. Glochidion asperum, *Mull.*—A shrub or small tree, branches at length glabrous, ramuli hispidulous, leaves 3-3½ inches long by 1½ inches broad, elliptic ovate or obovate, minutely mucronulate pubescent and rough on both sides, costa and veins prominent, petioles 1 line long, stipules linear subulate 1 line long, pedicels of both sexes short, male densely pubescent 2½ lines long, female tomentose I line long, calyxes subtomentose, segments of the female oblongo-obovate subacute, ovary globose 4-celled slightly tomentose, style-column subcylindric pubescent about as broad and twice or nearly 3 times as long as the ovary.—Phyllanthus asperus, *DC. Prod.* xv. 297.

Malabar and Concan.

11. Glochidion diversifolium, *Mull.*—Male flowers fasciculate, female glomerate, calyxes small, segments elliptic, ovary globose 2-4-5 celled obscurely sericeous gradually attenuated into a conical silky styline column which is 1½ times longer than the ovary, with 3-4 erect lobes at its apex, capsule depressed deeply 3-4 sulcate very shortly pubescent.—Phyllanthus, *DC. Prod.* xv. 297.

Var. *α. longifolium*, ramuli glabrous or the younger ones pubescent and soon glabrous, leaves elongate, capsules hoary-pubescent.—G. ellipticum, *Wight Icones* 1606.

Malabar, Concan, &c.

Var. *β. Wightianum*, ramuli glabrous, leaves acute at the base very unequal sided, long cuspidato acuminate.

Southern India.

§ 3. *Style-column obovoid or ovoideo-cylindric, somewhat constricted at the base, thick, broader than the base of the ovary.*

§ *Female calyx* 6-*cleft, ovary* 5-6 *celled.*

12. Glochidion Neilgherrense, *Wight.*—For description, &c. see Pl. clxxvii.

13. Glochidion arboreum, *Wight.*—A small tree, branches pubescent, leaves about 2 inches long and 1 inch broad, oblongo-ovate acuminate unequal sided at the base glabrous, petioles about 1½-2½ lines long, male flowers on pedicels 3 lines long fascicled, female subsessile glomerate both mixed, male calyx 6-parted, female sub 6-cleft both pubescent, segments of the female broad triangularly-ovate sometimes connate in pairs pubescent externally. Connective much elongated, ovary 5-celled glabrous, style column thick subobvoid truncate about 3 times as long as the ovary, 5-toothed at the apex, capsule crowned until maturity with the persistent style-column.—Phyllanthus arboreus, *DC. Prod.* xv. 303. G. arboreum, *Wight Icones* 1907.

Tinnevelly and Travancore Ghat forests.

§ *Female calyx* 6-*parted.*

* *Ovary* (4) 3-*celled glabrous.*

14. Glochidion coriaceum, *Thw.*—A small tree glabrous in all its parts, leaves 4-6 inches long by 1½-2½ inches broad, ovate or oblongo-ovate, slightly acute at the base, equal sided coriaceous smooth, primary veins prominent only 3-4 on each side, petioles 1½-2 lines long thick. Female calyx sessile a little more than 1 line long coriaceous glabrous, segments oblongo-elliptic obtuse, ovary depresso-obovoid 3-celled glabrous, style column oblongato-obovoid 3-4 times as long as the ovary, constricted at its base, in fruit slender cylindric 4 times longer than broad, capsule 3-coccous depresso-globose about ½ inch in diameter 3-sulcate, male flowers not known.—Phyllanthus coriaceus, *DC. Prod.* xv. *p.* 304. Glochidion coriaceum, in part, *Thw. En. Pl. Zey. p.* 284, (*c. p.* 342 *only*).

Ceylon, central provinces 3000-4000 feet elevation. No. 7, brachylobum, and 15 pycnocarpum, are closely allied, and considered by Thwaites to belong to this species.

15. Glochidion pycnocarpum, *Mull.*—A small tree, glabrous in all its parts, branchlets slightly angular above, stipules broad triangular short persistent, leaves 1½-3 inches long by about 1 inch broad, obliquely lanceolate cuspidato-acuminate or gradually acuminate, unequal at the base, slightly coriaceous scarcely shining, petioles about 2 lines long. Male and female flowers mixed in the axils, male on pedicels 4 lines long, female sessile, male calyx-segments lanceolato-elliptic, female broadly ovate acute all glabrous, ovary globose 3-celled glabrous, style-column cylindrico-ellipsoid about as broad as and twice as long as the ovary, obtusely 3-lobed, a little constricted at the base, in fruit cylindrico-obovoid twice as long as broad, capsule scarcely more than ¼ inch in diameter blackish. —Phyllanthus, *DC. Prod.* xv. 304. G. coriaceum, *Thw. l. c. in part.* (*c. p.* 2529).

Ceylon, central provinces, like the preceding, but the leaves small and less coriaceous and unequal at the base, and the female calyx and capsule much smaller, and the styline column much thicker in fruit.

16. Glochidion Jussieuanum, *Wight.*—A small tree, quite glabrous in all its parts except the female calyx, ramuli slender, stipules obliquely triangulari-ovate acute about 1 line long, leaves 3-4 inches long by 1½ inch wide, ovato or elliptico-lanceolate cuspidato-acuminate, submembranaceous, petioles 1½-1¾ lines long. Female pedicels equal to male pedicels, about twice as long as the petioles, segments of the female calyx oblongo-elliptic subacute glabrous outside adpressedly puberulous within, ovary depresso-globose 3 (4)-celled glabrous, column of styles thick cylindrico-obovoid or ellipsoid constricted at the base, glabrous twice as long and a little broader than the ovary.—Gynoon Jussieuanum, *Wight Icones* 1908. Phyllanthus, *DC. Prod.* xv. 304.

Ceylon, up to 4000 feet elevation.

17. Glochidion stellatum, *Retz.*—A small tree, glabrous in all its parts, ramuli angled greenish, stipules broadly triangulari-ovate acute short rather rigid, leaves 3 inches long by 1-1½ inches broad, oblongo-ovate or oblongo-elliptic, shortly acute at both ends, coriaceous, smooth rather shining pale above, somewhat fuscous beneath, petioles 1½ lines long. Male pedicels larger than female, shorter than the petioles. Segments of the female calyx oblongo-elliptic glabrous, ovary sub depresso-globose 3-celled glabrous, column of styles oblongo-obovoid broader than and 2-3 times longer than the ovary, shortly trifid at the apex. Capsule about 3 lines in diameter.—Phyllanthus stellatus, *Retz. Obs. Bot. Fasc.* 5 *p.* 29 ;—*DC. Prod.* xv. 305. Gynoon rigidum, *Adr. Juss. Tent. Euph. p.* 107 *i.* 3. *f.* 9. Glochidion rigidum, *Mull.*

Ceylon, Southern India, Sikkim, nearly allied to the last species.

§ 4. *Style-column broader above, narrowed at the base, but there scarcely narrower than the ovary, not constricted in a circle just at the base. Ovary* 6-3-*celled, puberulous.*

18. Glochidion Malabaricum, *Mull.*—A small tree, ramuli puberulous. Stipules lanceolato-subulate rather rigid entire 1½ lines long, leaves 2½ to 3¼ inches long by 1-1½ inches broad, oblongo or lanceolato-elliptic, shortly or acutely cuspidato-acuminate, subacute at the base, the costa and primary veins beneath puberulous or at length glabrous, petioles 1¾ lines long, flowers numerous. Males with slender pedicels, female subsessile, glomerate, both sexes mixed, calyx-segments lanceolate male at length elongate, ovary 3-4 celled globose puberulous, style-column obconico-cylindric not constricted at the base, about equal in breadth but twice as long as the ovary, acutely 6-8 lobed at the apex puberulous.—Phyllanthus Malabaricus, *DC. Prod.* xv. 305.

Malabar, Canara and Concan.

§ 5. *Style column broader above, narrowed at the base, and narrower than the ovary, not constricted in a circle just at the base.*

1. *Column of styles thick about once or twice as long as the ovary.*

* *Ovary* 8-5-*celled glabrous.*

19. Glochidion Perrottetianum, *Mull.*—A small tree, glabrous in all its parts except the female calyx, ramuli slightly angled, stipules small ovate, leaves lanceolato-elliptic slightly unequal sided glabrous olive-green above, reddish brown beneath, petioles 1¾ lines long broad and gradually running into the leaf, female flowers sessile subsolitary, female calyx large 5-6 toothed obconical rufo-puberulous. Ovary 5-6 celled globose glabrous, column of styles broadly obconical thick truncate asperulous slightly 5-6 cleft, in length slightly exceeding the ovary, in breadth equalling it at the base and not constricted, capsule 5-6-coccous much depressed, ½ an inch in diameter, 3 lines long. Male flowers unknown.

Nilgiris.

** *Ovary 4-3 celled, hairy.*

20. GLOCHIDION VELUTINUM, *Wight.*—A small tree, branches and branchlets rather tomentose, leaves oblongo-elliptic or oblongo-obovate, rather densely pubescent, shortly acuminate, often acute at the base, 2-2½ inches long. Male pedicels 3 times as long as the petioles, pubescent, female equalling the petioles or a little longer, ovary 4-celled globose sericeo-tomentose, style-column cylindrico-obovoid truncated at the apex 4 cleft, about twice as long as the ovary, whitish tomentose, capsule subglobose small (4 lines in diameter.) *Wight Icones* 1907. Phyllanthus, *DC. Prod.* xv. *p.* 309.

Very common throughout our western forests up to 4000 feet, also in Sikkim and Khasya.

2. *Column oblongo-obovoid or oblongo-obconical, rather stout, 3-4 times as long as the ovary, ovary 5-3 celled, hairy.*

21. GLOCHIDION DALTONI, *Mull.*—A small tree, branchlets slightly angled fuscous glabrous, leaves 3-4 inches long by 1-1½ inches broad narrow lanceolate rather unequal sided often slightly falcate glabrous fuscous, rather shining above, petioles about 2 lines long. Male flowers fasciculate, female subsessile glomerate the pedicels of the former nearly 3 times as long as the petioles glabrous, ovary 4-celled depresso-subglobose densely cinereo-sericeous contracted at the apex, style column narrow obconico-obovoid, narrowed at the base and there much narrower than the ovary, obtusely 4-lobed at the broader apex, 3-4 times longer than the ovary glabrous, capsule depresso-turbinate deeply 4-sulcate very shortly pilose, about 5 lines in diameter, slightly pilose (under the lens.)—Phyllanthus, *DC. Prod.* xv. 310.

Nilgiris, also in Northern India and Birmah.

22. GLOCHIDION HEYNEANUM, *Wight.*—A small tree, male pedicels glabrous, female pubescent, the segments of the male calyx ovate acute glabrous, female oblongo-obovate acuminate pubescent, ovary 5-celled adpressedly sericeous globose, style-column elongato-obconical 3 times as long as the ovary, but much narrower than it at the base, leaves lanceolate and shortly acuminate acute at the base, rather unequal sided, rusty pubescent beneath, 3½ to 4¼ inches long by 1½ inches broad. Capsule 2-3 lines broad reddish.—Glochidion Heyneanum, *Wight Icones* 1908 (*dissections* only). Phyllanthus, *DC. Prod.* xv. 311.

Southern India.

23. GLOCHIDION SYMPLOCOIDES, *Mull.*—A small tree, 15-20 feet, ramuli obscurely subtomentose, stipules triangulari-lanceolate pilose nearly equalling the petioles, leaves oblongo ovate rather obtuse, rather rigid glabrous above, softly pubescent beneath, 1½-3 inches long by about ¾ to 1½ inches broad, petioles 1-1½ lines long. Male pedicels twice as long as the petioles rather villous, male calyx a little larger than the female, female pedicels obsolete, female calyx puberulous on the outside glabrous within, ovary 3-celled depresso-globose tomentose, style-column obovideo-cylindrical rather stout, slightly broader above and there densely hispidulous, 4 times longer than the ovary, capsules glabrous depressed 3-lobed.—Phyllanthus symplocoides, *DC. Prod.* xv. 311. Glochidion montanum, *Thw. En. Pl. Zey.* 286. (*c. p.* 3133.)

Ceylon, central provinces, at Oova 4000-6000 feet elevation, closely allied to G. Moonii, but it differs in its more arboreous habit, its smaller less acuminate leaves and glabrous capsules.

3. *Column clavate slender 4-8 times as long as the ovary. Ovary 3-celled.*

* *Ovary glabrous.*

24. GLOCHIDION LEPTOGYNUM, *Mull.*—A small tree, ramuli subglabrous flexuose, stipules triangulari-ovate short pilose the margins fimbricato-ciliate, leaves 2½ to 3 inches long by 1-1½ inches broad, ovato-or oblongato-elliptic acute at both ends, glabrous slightly coriaceous brownish, petioles 1-1¼ lines long. Male pedicels 2-3 times longer than the petioles very slightly hirsute, female pedicels obsolete, calyx in both sexes pilose outside glabrous within, the segments of the male oblongo elliptic subacute, of the female obovato-lanceolate acuminate, ovary 3-celled depresso-globose glabrous, style-column slenderly clavate glabrous about 8 times as long as the ovary, gradually narrowed at the base and there narrower than the small ovary, capsule glabrous depressed 3-lobed.—Phyllanthus leptogynus, *DC. Prod.* xv. *p.* 312. Glochidion Gardneri, *Thw. En. Pl. Zey. p.* 286. (*c. p.* 3156.)

** *Ovary hairy.*

25. GLOCHIDION MEMORALE, *Thw.*—A tree, ramuli angled obscurely puberulous, stipules linear lanceolate puberulous, leaves 3½-7 inches long by 1½-2 inches board, ovato-lanceolate oblique at the base gradually narrowed at the apex into a long acumen, sub-coriaceous adpressedly pubescent on the nerves, petioles about 2 lines long puberulous. Male pedicels 3-4 times longer than the petioles slightly pubescent, female pedicels a little longer than the petioles pubescent, calyx segments ovato-lanceolate acute pubescent on the outside glabrous within, ovary 3-celled pubescent. Style column clavate gradually narrowed into the ovary and about 8 times as long as it, puberulous below glabrous above. Capsule glabrous depressed 3-lobed.—Phyllanthus memoralis, *DC. Prod.* xv. 312. Glochidion memorale, *Thw. l. c.* 286. (*c. p.* 3015.)

Ceylon, Pasdoon Corle, at no elevation.

26. GLOCHIDION GLAUCOGYNUM, *Mull.*—A small tree, leaves ovato-or oblongo lanceolate acuminate, 2-8 inches long by 1-3 inches broad, shortly villosulous as are the ramuli, petioles and calyxes. Male flowers fasciculate, female glomerate, segments of the male calyx elliptico-lanceolate pubescent on the outside glabrous within, female segments spathulato-lanceolate pubescent on both sides, ovary 3-celled globose obscurely fulvo-villosulous. Style-column cylindrico-clavate about 6 times longer than the ovary and at the

base a little narrower than it, slightly clavate and thickened at the apex 4-lobed, above pruinoso-glaucescent, below fulvo-villosulous, capsule nearly ½ inch broad.—Phyllanthus glaucogynus, *DC. Prod.* xv. 312. Glochidion Moonii, *Thw. in part.* (*c. p.* 2150.)

Ceylon ; differs from Moonii in the pubescence being much shorter or shortly villosulous instead of hirsuto-pubescent, and in the leaves being glaucescent beneath, and in the segments of the female calyx and the styline column being shorter.

27. Glochidion Moonii, *Thw.*—A small tree, leaves 3-8 inches long by 1-3 inches broad; oblongo-elliptic or sometimes ovato or elliptico-lanceolate shortly but acutely cuspidato-acuminate, acute at the base, somewhat unequal sided, hirsuto-pubescent on both sides, petioles about 2 lines long. Male pedicels 2-3 times longer than the petioles, obscurely fulvo-villous, as are the calyxes and styline column. Male calyx segments elliptico-lanceolate hirsute outside glabrous within. Female segments lineari-spathulate acute hirsute on both sides, ovary 3-celled subglobose hispidulous. Style-column very long slenderly clavate many times longer than the ovary, much narrower than the ovary at its base, above rather broader slightly sublanato-villous except at the apex. *Thw. En. Pl. Zey. p.* 286 (*c. p.* 258.) Gynoon hirsutum, *Wight Icones.* 1909. Phyllanthus Moonii, *DC. Prod.* xv. 286.

Ceylon, very common in central provinces.

I have followed DeCandolle's arrangement of the species, but I am pretty certain that the number will have to be considerably reduced.

MELANTHESOPSIS. Mull.

Gen. Char. Monœcious. Male-calyx gamosepalous turbinate 6-lobed in 2-series, lobes imbricate, transversely plicato-subappendiculate at the back, female-calyx turbinate, 6-cleft, about a quarter or a half down rotately spreading above, more or less enlarging with the fruit, petals wanting in both sexes, disk none. Stamens 3, central monadelphous, anther-cells adnate lengthways extrorse, connective produced more or less above the cells, rudiment of ovary none, ovary 3-celled, cells 2-ovuled. Styles 2-parted, fruit at first baccate at length capsular 3-valved, seed with an aril and a distinct hilum albuminous, embryo slightly curved, cotyledons broad equalling the radicle. Trees or shrubs, flower branches solitary or fascicled, leaves distichous, short petioled penniveined entire bistipulate, flowers axillary, male inferior subracemose or fascicled, female occupying the superior axils, generally solitary or sometimes subracemose. *DC. Prod.* xv, 436. Melanthesa, *Bl. Bijdr.* Phyllanthus Sp., *Auct.*

1. Melanthesopsis patens, *Roxb.*—A small tree or large shrub, leaves membranaceous, entire oval to oblong or ovate obtuse often unequal sided, ½-1 inch long, flowers axillary, the female solitary, the male fascicled in the lower axils, or sometimes male and female mixed, fruit size of a pea, the enlarged calyx colored.—Phyllanthus patens, *Roxb. Fl. Ind.* iii. 667. Melanthesopsis, *DC. Prod.* xv. 437.

Var. α. oblongifolia.—A large shrub, leaves oblongo-ovate or elliptic obtuse at both ends or subacute, beneath pale glaucous, about ¾ inch long. Malabar, &c. Melanthesa obliqua, *Wight Icones* 1898.

Var. β. turbinata.—A pretty large tree, leaves ovate about 1-inch long. Phyllanthus turbinatus, *Roxb. l. c.* 666.

Mountains on the east side of the presidency.

Var. γ. vulgaris.—A shrub, leaves broadly elliptic slightly glaucescent beneath, ½ to ¾ inch long. Melanthesa turbinata, *Wight Icones.* 1897.

Common throughout India and Ceylon.

The Analysis, Pl. XXIV., fig. 2, under the name of this genus, belongs to the next genus Breynia.

BREYNIA. Forst.

Gen. Char. Male-calyx gamosepalous turbinate 6-lobed in two rows as in Melanthesopsis, petals none, disk none, stamens central, anthers adnate lengthways to a broad club-shaped filament, which is prolonged and flattened at the apex, rudiment of ovary none, (unless the broad club be so considered), ovary globular, styles none, stigmas 3, fruit baccate mealy tricoccous, the fruiting calyx not enlarged or sometimes enlarging. Seed exarillate ecarunculate albuminous, radicle shorter than the broad cotyledons. Small trees or shrubs, only differing generically from Melanthesopsis in the seed being exarillate and the radicle being shorter than the cotyledons. *Forst. Gen. t.* 73 ;—*DC. Prod* xv. *p.* 438.

* *Fruiting calyx not enlarged.*

1. Breynia rhamnoides, *Willd.*—A small tree, branchlets bifarious flexuose, leaves alternate oval entire smooth, about an inch long by ¾ inch broad, male flowers fascicled in the axils several together, female solitary, female calyx not increasing in size with the fruit, ovary with a depressed apex, styles none, berry globose bright red. Phyllanthus rhamnoides, *Willd. sp.* 4 *p.* 580. Breynia, *DC. Prod.* xv. *p.* 440. Melanthesa, *Bl. Bijdr.* 591. Phyllanthus rhamnoides, *Wight Icones* 1898 not *Roxb.* Phyllanthus vitis idœa, *Roxb. Fl. Ind.* iii. 665.

Common throughout India and Ceylon, also in Java and the Philippines ; the wood is white, hard, and durable, and in use with the natives.

Analysis, Pl. XX, fig. 2.

(Incorrectly under the name Melanthesopsis patens.)

1. Portion of a branch in flower.
2. A male flower.
3. The same open, only shewing 4 lobes of the 6-lobed calyx, anthers 3 adnate lengthways to the square topped broad club-shaped filament.
4. A female flower.
5. Female calyx opened out.
6. Ovary cut vertically.
7. Ovary cut transversely, 3 cells each 2-ovuled.
8. Fruit.
9. Fruit cut vertically.

PUTRANJIVA. Wall.

For Gen. Char. see letter-press to Pl. cclxxv.

Sec. Euputranjiva.—*Male calyx* 3-5 *parted, female* 5-6 *parted. Stamens* 3, *filaments monadelphous, or* 2 *connate and the third free. Ovary* 3-*celled, stigma triangularly dilated.*

1. Putranjiva Roxburghii, *Wall.*—For description, &c. see Pl. cclxxv.

Sec. Palenga.—*Male calyx* 2-*parted, female* 4-*parted. Stamens* 2, *filaments free, ovary* 2-*celled, stigmas reniform.*

2. Putranjiva Zeylanica, *Thw.*—A tree 40-50 feet high, glabrous, branches terete, leaves lanceolate acuminate penni-veined, oblique shining, blackish green, beneath slightly glanduloso-punctate, 3-5 inches long by 1-1¾ inch broad, petiole rugulose 2 lines long. Stipules minute, flowers white ¾ line long, pedicels 1 line long, fruit 8 lines long 4 lines broad fusco-tomentose.—Palenga Zeylanica, *Thw. Hook. Journ. of Bot.* viii. 270 *et En. Pl. Zey. p.* 287. Putranjiva, *DC. Prod.* xv. *p.* 444.

Ceylon, Ambagamwa district, at about 2000 feet elevation, called Palenga.

Analysis, see Pl. cclxxv.

1. A male flower shewing the 2-parted male calyx broken off and the 2 free stamens.
2. Female flower 4-lobed, calyx, ovary and reniform stigmas.
3. Fruit cut vertically, shewing the embryo lying in albumen.

SECURINEGA. Juss.

Gen. Char. Calyx of male and female 5-parted quincuncial, segments persistent, petals none, disk of the male extra staminal, glands alternating with the calycine segments and stamens. Stamens 5 opposite the calyx-segments inserted round the rudiment of an ovary, filaments free, anthers oblongo-ellipsoid, cells cohering lengthways extrorsely or introrsely 2-cleft, rudiment of ovary 2-3 partite. Disk of female 5-lobed, ovary 3-2-celled, cells 2-ovuled, styles 3 shortly connate at the base, bifid at the apex, lobes subreflexed, fruit at first more or less fleshy at length capsular 3-coccous or by abortion 2-1-coccous, cocci 2-valved normally 2-celled, seed obtusely triangular smooth, embryo nearly straight, radicle nearly equalling the cotyledons, cotyledons fleshy slightly curved narrow ovate elliptic or obovate. Trees or shrubs with a very hard wood (hence the name securis, an axe, nego, to refuse), branches compressed tetragonal or terete, sometimes spinescent at the apex, leaves minutely bistipulate penniveined, flowers dicœcious or monœcious always axillary, male fascicled more numerous, female solitary or less numerous. *Juss. Gen. Pl. p.* 388. Fluggea, *Willd.* Besera, *Spreng.* Geblera, *Fisch. et Mey.* Colmeiroa, *Reut.* Meineckia, *Baill.* Villanova, *Pourr.* Sched. ex cutanda. Xylophylla, *Willd.*;—*DC. Prod.* xv. 446.

Sec. Fluggea.—*Anthers at least when young distinctly extrorse.*

§ Glands of the male flower free, flowers dicœcious.

1. Securinega obovata, *Willd.*—A small or middling sized tree, branches ascending, floriferous branchlets quadrangular not spinescent at the apex, leaves oblongo-ovate or oval entire smooth, 1-2 inches long by ½-1 inch broad, flowers dicœcious very small as in the generic character, axillary, fruit size of a pea white fleshy.—Xylophylla obovata, *Willd. Enum. Pl. Hort. Berol. p.* 329. Securinega, *DC. Prod.* xv. 449. Phyllanthus virosus, *Roxb. Fl. Ind.* iii. 659. Fluggea virosa, *Baillon.*

Common throughout India, also in China, the Philippines, Australia, Java, Mauritius, Madagascar and Africa; the bark is a strong astringent and used to intoxicate fish; the plant is generally only a shrub in the plains, but a tree up in the mountains.

2. Securinega leucopyrus, *Koen in Roxb.*—A shrub; branches rigid spreading in every direction round the trunk, floriferous branchlets terete, spinescent at the apex, the spinous part leaf and flower-bearing, leaves short petioled obcordate smooth entire, stipules minute oval obtuse, flowers diœcious axillary, as in the genus, fruit size of a grain of pepper di-tricoccous.—Phyllanthus leucopyrus, *Koen. MS. in Roxb. Fl. Ind.* iii. 658. Securinega, *DC. Prod.* xv. 451. Fluggea, *Willd*;—*Wight Icones* 1875.

Common throughout the Madras presidency, Bombay and in Ceylon.

Analysis, Pl. XXIV., fig. 4.

1. Portion of a branch of the male tree in flower.
2. A small flower bud.
3. A male flower.
4. The male flower open, 5 free stamens opposite the calyx segments surrounding the 3-cleft rudiment of ovary, 5 glands alternate with stamens.

5, 6. Anthers, front and back view.

7 to 12 were by mistake drawn from the female of Flacourtia sepiaria, and do not belong even to this order.

MISCHODON. Thw.

For Gen. Char. see letter-press to Pl. ccxc.

1. Mischodon Zeylanicus, *Thw.*—For description, &c. see Pl. ccxc.

BACCAUREA. Lour.

For Gen. Char. see letter-press to Pl. cclxxx.

1. Baccaurea sapida, *Roxb.*—For description, &c. see Pl. cclxxx.

I have lately found (Tambacherry ghat, Wynaad) trees with yellowish white (instead of red) flowers; these would probably have fruit of the same color.

BISCHOFFIA. Bl.

For Gen. Char. see letter-press to Pl. cclix.

1. Bischoffia Javanica, *Bl.*—For description, &c. see Pl. cclix.

HEMICYCLIA. Wight & Arnt.

For Gen. Char. see letter-press to Pl. cclxxix.

1. Hemicyclia elata, *Bedd.*—For description, &c. see Pl. cclxxix.

2. Hemicyclia sepiaria, *WA.*—A small tree or large ramous shrub, leaves alternate elliptic or ovate obtuse coriaceous glabrous entire or repand-denticulate, 1½-2 inches long by ¾-1¼ broad, flowers axillary usually aggregated longish pedicelled, male flowers 7-11 androus, no rudiment of an ovary, sepals 4 suborbicular concave pubescent outside, female subsessile, peduncles afterwards elongating, ovary on a fleshy disk 2-celled crowned with 2-sessile semicircular stigmas, calyx divisions suborbicular concave pubescent on the outside, ripe fruit globose. *Wight and Arnott. in Ed. New Phils. Journ. v.* 14. 297 ;—*Wight Icones* 1872.

Mountains on the east side of the presidency. Malabar, very abundant on the mountains in the Salem district up to 3000 feet elevation. Ceylon ; the wood is very hard and close grained and something like box ; the tree is called in Ceylon Weera.

3. Hemicyclia lanceolata, *Thw.*—A middling sized tree, ramuli petioles and inflorescence pilose, leaves subglabrous lanceolate obtusely acuminate mucronate, oblique at the base subacute, submembranaceous beneath pilose at the costa, 1-3 inches long by ½-1 inch broad, petiole 1-2 lines long, flowers small few about 2 lines in expansion. *Male,* stamens about 10-16 ; *female,* style short dilated bifid reflexed, drupe oblong oblique at the apex red, 6 lines long, 3 lines wide. *Thw. En. Pl. Zey. p.* 286.

Ceylon, Cultura ; the wood is hard and close grained.

4. Hemicyclia Gardneri, *Thw.*—A middling sized tree, young parts, petioles and inflorescence pubescent, leaves lanceolate crenate retuse mucronate oblique at the base, the costa beneath adpressedly strigose and the veins often more or less hairy, 1-3 inches long by ½-1 inch broad, petiole 1-2 lines long, flowers few pale-yellowish 6 lines in expansion. *Male,* stamens about 24 round the disk, which is hollowed out in the centre, rudiment of ovary none. *Female,* style short, stigma convex fleshy, drupe oblong 4 lines long.

Ceylon, in the hot drier parts of the island.

5. Hemicyclia venusta, *Wight.*—A small elegant drooping tree, gemmæ pubescent, leaves elliptico-lanceolate gradually attenuated into a fine acumen, coriaceous entire pale colored quite glabrous above, beneath with a few inconspicuous hairs (only visible under the lens) coriaceous, 3-4 inches (or rarely more) long by 1-1½ broad, venation prominent, petioles 3-4-lines long, inflorescence tomentose in axillary fascicles, the pedicels a little shorter than the petioles, the male with more numerous flowers than the female, stamens 5-9.—Astylis venusta, *Wight Icones tab.* 1992 (the leaves represented longer than I have ever seen them.)

Western ghats from S. Canara down to Tinnevelly, common in the moist forests 2000-4000 feet elevation ; the wood is very hard.

CYCLOSTEMON. Bl.

For Gen. Char. see letter-press to Pl. cclxxviii.

Sec. Stenogynium.—*Stamens few, ovary 2-celled, stigmas sublinear entire, the thick apex peltately or semipeltately dilated.*

1. Cyclostemon Indicus, *Müll.*—A considerable tree, branches and branchlets slender glabrous, leaves 3-5 inches long by 1-2 inches broad, ovate or elliptico-lanceolate, long cuspidate acuminate, entire submembranaceous reticulato-venose glabrous, petioles 2-3 lines long, flower-pedicels slender as long as the petioles, male pedicels and calyx, except the ciliate margin glabrous, those of the female sericeo-pubescent, anthers 6-4, disk central thick undulated subcompressed, ovary sericeous, styles slender, apex peltately dilated. *DC. Prod* xv. 481.

Malabar and Canara, also in Northern India, Sikkim, Khasya, &c. I have never met with this tree.

Sec. Eucyclostemon.—*Stamens numerous, ovary 2-celled, stigmas broad 2-lobed.*

2. Cyclostemon macrophyllus, *Bl.*—For description, &c. see Pl. cclxxviii.

3. Cyclostemon Malabaricus, *Bedd.*—A large tree, young branches densely aureo-tomentose, leaves entire membranaceous oblong rather suddenly acuminated at the apex, unequal sided at the base (one side attenuated the other rounded) tomentose on both sides, when young at length glabrous above except the costa, pilose beneath on the costa and veins, 8-9 inches long by 2½ broad, primary veins prominent beneath 7-10 on each side of the costa, petioles about 3 lines long, male flowers densely fascicled on the older branches, pedicels about 3 lines long aureo-tomentose, calyx-segments 4 broad cucullate imbricate densely aureo-tomentose on the outside, glabrous within, stamens very numerous in 2-3 rows round a tomentose cup-like disk, anthers introrse, rudiment of ovary none, female flowers not seen, fruit solitary along the the older branches on pedicels ½ inch long, about 1 inch long by ¾ inch broad densely tomentose crowned by 2 reniform stigmas.

Tinnevelly ghat forests, 3-4000 feet elevation.

APOROSA. Bl.

For Gen. Char. see letter-press to Pl. cclxxxvi.

1. Aporosa Lindleyana, *Wight.*—For description, &c. see Pl. cclxxxvi.

2. Aporosa fusiformis, *Thw.*—A middling sized tree, leaves subentire coriaceous glabrous obovate or rotundate short and obtusely acuminate or retuse, acute or rounded at the base, 2½-5 inches long by 1¾-3 inches broad, primary veins about 5 on each side, petioles ½-¾ inch long, catkins ferruginous tomentose, bracts rotundate ciliate, male flowers generally diandrous, female flowers crowded, ovary glabrous, stigmas 2-3-parted, lobes revolute bifid at the apex, fruit fusiform 6-8 lines long 3-4 lines broad, pericarp moderately fleshy. *Thw. En. Pl. Zey. p.* 288.

Ceylon, central provinces, 4000-6000 feet elevation.

3. Aporosa latifolia, *Moon.*—A middling sized tree, leaves subentire glabrous subcoriaceous obovate obtuse more or less rotundate or subcordate at the base, 4-8 inches long by 3-5 inches broad, primary veins about 7 on each side, petiole ½-1 inch long. Catkins ferrugineo-tomentose, bracts rounded ciliate, male flowers generally diandrous, female flowers sessile, ovary pilose, stigma 3-parted, lobes reflexed, bifid at the apex, fruit subsphærical a little conical about an inch long, pericarp very fleshy.—Agyneia latifolia, *Moon. Cat. p.* 65. Aporosa, *Thw. En. Pl. Zey. p.* 288.

Ceylon, south of the island at no elevation.

4. Aporosa acuminata, *Thw.*—A small tree, sparingly ramous, young parts pilose, leaves glabrous entire membranaceous ovato or oblongo-lanceolate acuminate acute at the base, 1½-4 inches long by ½-2 inches broad, petioles 2-4 lines long. Catkins ochraceo-pilose short generally solitary, female generally 1-flowered, ovary ovoid pilose 3-celled, stigma large 3-parted, lobes bifid at the apex, fruit subsphærical sessile, about ¾ inch in diameter, greenish-red generally 3-seeded, pericarp very fleshy, seed yellowish red the outer coat fleshy. *Thw. En. Pl. Zey. p.* 288.

Ceylon, Ambagamwa district and near Balangodde, 2000-3000 feet.

5. Aporosa lanceolata, *Tul.*—A small tree, branches terete elliptico or obovato-lanceolate here and there subrepando-denticulate, cuspidately acuminate at the apex, 4-5 inches long by 1-1½ inches broad subcoriaceous, petioles 4-5 lines long. Male catkins pubescent, flowers generally diandrous, rudiment of ovary minute inconspicuous, female spikes about 5-flowered, ovary ampullœform, glabrous. Stigma short sessile disciform 2-lobed, lobes bifid often denticulate, fruit subsphærical the size of a pea. Seed with the outer coat fleshy yellow.—Lepidostachys lanceolata, *Tul. in Ann. des Sci. Nat. (Bot.) Ser.* 3 v. 15 *p.* 254. Aporosa, *Thw. En. p.* 288 ;—*DC. Prod.* xv. 475.

Ceylon, common up to 2000 feet elevation.

Aporosa sphœrocarpa, *DC*, is only, I believe, a form of A. Lindleyana.

ANTIDESMA. Burm.

Gen. Char. Flowers diœcious, the males in catkins, the females in racemes or spikes, perianth small and calyx-like of 3 to 5 (rarely 6-8) segments or lobes. *Male:* stamens 2-5 (rarely more), filaments free. *Female:* ovary 1-celled with 2 pendulous ovules, styles 3-4 very short and divergent united at the base, fruit a drupe usually somewhat flattened and oblique. Trees or shrubs, leaves alternate entire.—Stilago, *Schreb.*

§ *Flowers* (5)-8 *merous, stigmas terminal.*

1. Antidesma Ghæsembilla, *Gœrtn.*—A small tree, the young branches leaves and inflorescence softly pubescent and tomentose, stipules subulate, leaves obovate broadly elliptical or nearly orbicular, often slightly cordate at the base very obtuse or suddenly acute, 1½-3½ inches long by 1-3 broad, primary veins prominent, petioles 2-6 lines long, rarely longer, spikes paniculate dense-flowered, the male longer and more slender, bracts small oblongo-obovate acute ciliate, male calyx sessile deeply 5-rarely 7-parted, disk pilose, stamens 5 rarely 7, ovary ovoid very villous; stigmas short, fruit obovoid slightly compressed. *Gœrtn. Fruct.* i. 189. *t.* 39;—*DC. Prod.* xv. 251.

Var. α. panicularum.—Spikes very densely flowered, very densely lunato-tomentose, pedicels 3-4 times shorter than the fruit. A. paniculatum, *Roxb. Fl. Ind.* iii. 770;—*Wight Icones* 820.

Var. β. pubescens.—Spikes less densely flowered and less compound and more slender, the whole plant less densely tomentose. A. pubescens, *Roxb. Fl. Ind.* iii. 770;—*Wight Icones tab.* 821.

Both varieties are found on the mountains on both sides of the Madras presidency, and *var. β.* in Ceylon; they both extend to N. India, Birmah, Java, &c.; they are both met with in gardens in this presidency; the tree is called Boo-ambilla in Ceylon.

§ *Flowers* 4-3 *merous, triandrous; stigmas lateral.*

2. Antidesma Zeylanicum, *Lam.*—A shrub or small tree, branches slender glabrous, the young ones purplish and sometimes minutely pilose, petioles about one line long, leaves 1-3 inches long by ½-1¼ inch broad, oblongo-rhombeo-ovate or rhombeo-lanceolate acute at both ends, glabrous, prominently reticulated, spikes slender, male elongate flexuose ferrugineo-pubescent as long as or exceeding the leaves, bracts broadly ovate very short, calyx 3-4 parted to beyond the middle triandrous, rudiment of ovary at length obsolete, disk thick glabrous, ovary subglabrous, putamen small lunato-incurved. *Lam. Encycl.* i. *p.* 207.

Ceylon, common in the hotter parts of the island, called Heen-ambilla.

§ *Flowers* 4-3-*merous; stamens* 4-3; *stigmas terminal.*

* *Flowers spiked.*

3. Antidesma Bunius, *Spreng.*—A tree, young parts slightly pubescent generally soon glabrous, leaves lanceolate to oblong obtuse acute or acuminate, glabrous and shining more or less coriaceous, 4-6 inches long by 1½-2 inches broad, petioles 2-4 lines long, stipules ovate cordate shorter than the petioles caducous, spikes axillary and terminal, the male 1-5 together, 4-6 inches long, slender interrupted, the female solitary and shorter; flowers sessile, stamens usually 3 rarely 4, fruit about 3-4 lines long smooth succulent bright red, putamen compressed rugose. *Spr. Syst. Veg.* i. 826;—*Wight Icones tab.* 819. Stilago Bunius, *Roxb. Fl. Ind.* iii. 758. A. comptum, *Tul. in Ann. des Sc. Nat.* 1851 *p.* 190;—*DC. Prod.* xv. 262. [Only a variety (found on the Tinnevelly mountains) with smaller more rigid leaves.] A. Thwaitesianum, *DC. Prod.* xv. 263.

Very common on all our Western Ghats, Mysore, and in Ceylon up to about 4000 feet elevation.

Analysis, Pl. XXIV, fig. 3.

1. Portion of a male spike or catkin.
2, 3. Triandrous male flowers, they are sometimes tetrandrous.
4, 5. Stamens, front and back view.
6. Portion of a female spike.
7. A female flower.
8. A bract.
9. Ovary cut vertically.
10. Ovary cut transversely.
11. Nearly ripe fruit.

Antidesma Roxburghii, *Tul.* (Stilago tomentosa, *Roxb.*), belongs to this section, but I have not found it wild in this Presidency; it occurs in gardens and is indigenous in Northern India.

* * *Flowers racemose.*

4. Antidesma pyrifolium, *Müll.*—A middling sized ramous tree, ramuli petioles and inflorescence cinereo-tomentose, leaves entire subglabrous ovate or oblong obtusely rostrato-acuminate channelled above at the costa, acute at the base, 2-4 inches long by ¾-2 inches broad, petioles 2-5 lines long, racemose panicled or simple axillary and terminal, bracts short broad acute, pedicels about equalling the calyx, flowers normally 4-merous (rarely 5-6-merous), disk subglabrous, abortive ovary mamillæform, calyx cupuliform,

lobes short rounded or a little acute, fruit subsphærical a little compressed, size of a pea, purple. *DC. Prod.* xv. 265. A. montanum, *Thw. En. Pl. Zey. p.* 289—not *Blume.*

Ceylon, central provinces, 3000-6000 feet.

The long petiole at once distinguishes this species; all the flowers I have examined were 4-androus.

§ *Calyx 4-3-merous 3-2-androus; stigmas terminal; flowers racemose.*

* *Bracts lanceolate.*

5. ANTIDESMA LANCEOLATUM, *Tul.*—A small tree, young ramuli glabrous or ferruginous, stipules linear subulate rather rigid longer than the petioles, leaves 3-5 inches long, 1-1½ inches broad, lanceolate with a longish acumen glabrous submembranaceous, petioles 2 lines long, racemes slightly pubescent simple or paniculato-ramous, 2-3½ inches long, bracts ovato-or lineari-lanceolate subulato-acuminate, calyx urceolate 3-4 crenate glabrous outside and within 3-2-androus, rudiment of ovary linear glabrous or subobsolete, disk thick globose glabrous concave at the apex, ovary oblongo-ovoid glabrous above. *Tul in Ann. des Sc. Nat.* 1851, *p.* 195;—*DC. Prod.* xv. 266.

Nilgiris, Tinnevelly ghats, Ceylon, also in N. India and Java; *it differs from diandrum in the shape and size of the leaves, in its larger stipules, shape of bracts, larger racemes, and glabrous disk.*

* * *Bracts ovate.*

6. ANTIDESMA DIANDRUM, *Roxb.*—A tree, ramuli soon glabrous, stipules about twice as long as the petioles erect pubescent deciduous, petioles rather ferrugineo-villous, about 1 line long, (short with reference to the other species), leaves 1¾-2½ inches long by 1-1½ inches broad or even larger, broad or narrow-elliptic, ovate or obovate more or less acute at the apex and base, glabrous above, pilose on the nerves beneath, racemes equalling or a little shorter than the leaves, lax slender simple or often sparingly branched subglabrous, bracts subglabrous, male pedicels slender nearly 1 line long, calyx glabrous on the outside fulvo-pilose within, urceolar shortly 4-toothed, diandrous, rudiment of ovary generally obsolete, disk adpresso-pilose, ovary ovoid glabrous at the apex. Stilago diandra, *Roxb. Fl. Ind.* iii. 759;—Ant. diandra, *Tul. l. c.* 198;—*DC. Prod.* xv. 266.

Found both on the eastern and western sides of the Madras Presidency and in Bengal.

7. ANTIDESMA ACUMINATA, *Wight Icones* 1991, is a doubtful member of this genus, as its fertile flowers are hermathrodite and the fruit is unknown. DeCandolle excludes it from the order, but judging from the figure, it seems to belong to this genus. It is said to be from Malabar, but I have not met with it. The following is Wight's description:—

"Shrubby or arboreous, leaves ovate oblong acuminate glabrous, stipules linear acute sometimes subfalcate unequal-sided, racemes axillary or terminal sometimes branched, bracts ovate acute, flowers short-pedicelled crowded male and hermathrodite, males 3-4 androus with a free capitate rudimentary style, calyx deeply 3-parted setaceo-dentate on the margin, stamens longer than the calyx, hermathrodite, calyx 3-4-parted, stamens 3-4 about the length of calyx, anthers 2-celled with a broad connective, ovary exceeding the calyx 1-celled, ovules 2 collateral pendulous from the apex, stigmas 3-4-lobed.

TRIBE BRIEDELIEÆ.

BRIEDELIA. WILLD.

For Gen. Char. see letter-press to Pl. cclx.

* *Primary veins 15-28 on each side of the leaf.*

1. BRIEDELIA RETUSA.—For description, &c. see Pl. cclx.

* *Primary veins 9-15 on each side.*

2. BRIEDELIA MOONII, *Thw.*—A tree, ramuli slightly hirsute, leaves nearly sessile, 4 to 6 inches long by 4-4½ inches wide, oblongo-elliptic or oblongo-obovate subobtuse at both ends, glabrous above, beneath minutely pubescent and prominently reticulato-venose, primary veins about 12 on each side, flowers axillary glomerate, female sessile, berry ovoid 3-4 lines long smooth. *Thw. En. Pl. Zey.* 279;—*DC. Prod.* xv. 497. Cluytia retusa, *Moon Cat.* Briedelia retusa, *Baillon.*

Ceylon, common up to 2000 feet elevation, called Pakaala; perhaps only a form of the common retusa, Pl. cclx., which is also common in Ceylon and called Kat-takaala, and from which it differs in its larger leaves, fewer primary veins, and ovoid fruit, and in the leaves not being at all glaucous beneath.

* * *Primary veins 6-10 on each side.*

I. *Calyx increasing with the fruit.*

3. BRIEDELIA STIPULARIS, *Linn.*—A scandent or sub-scandent large shrub, ramuli fulvo-tomentose or-pubescent slender, stipules lanceolate as long as the petioles, petioles about 2 lines long, leaves 2½-3 inches long by 1-1½ inch broad elliptic or obovate or

oblongo-obovate, entire obtuse at the apex, and shortly acute rarely acuminate, obtuse or slightly cordate at the base, above puberulous or subglabrous, beneath densely rufescento-pubescent, the primary veins 6-9 on each side, flower-heads generally furnished at the base with stipule-like bracts, male flowers sessile, female shortly pedicellate fulvo-sericeous, calycine segments greenish yellow ovato-triangular with a long acumen, at length increasing with the fruit, petals subsimilar in both sexes rather rigid obovate crenulate or entire, berry juicy blackish about 4 lines long oblong ellipsoid. Cluytia stipularis, *Linn. Mant. p.* 127. Briedelia, *Bl. Bijdr. p.* 597. *B.* scandens, *Roxb. Fl. Ind.* iii. 736.

A common plant on both sides of the presidency, also in Bengal, Java, the Philippines and Africa.

II. *Calyx not enlarging in fruit.*

4. Briedelia montana, *Willd.*—A good sized tree, ramuli glabrous, stipules small acute withering, petioles about 1½ lines long, leaves obovate or oblongo-obovate entire glabrous, 2-3 inches long by about 1 inch broad, primary veins about 8-10 on each side, flowers greenish male and female mixed in axillary dense sessile heads, bracts minute withering, calyx 1 line long, segments triangulari-ovate, petals subsimilar in both sexes suborbiculari-ovate, crenulate shortly unguiculate, inner disk of the female embracing about ⅓rd of the ovary, berry globular greenish succulent as large as a pea. *Willd. Sp. Pl.* iv. *p.* 978 ;—*Roxb. Fl. Ind.* iii. 735.

On the mountains on the east side of the Madras Presidency, Vizagapatam district, Orissa, &c., also in Bengal ; the wood is very similar to that of B. retusa, hard, red and very durable ; the tree is called Patenga in Telugu.

5. Briedelia Hamiltoniana, *Wall.*—A small tree, ramuli slender glabrous, stipules 1½ lines long lanceolato-linear deflexed spreading, petioles 2-3½ lines long, leaves membranaceous glabrous 2-3½ inches long by 1-1½ inches broad, oblongo-rhomboideo-obovate entire or subrepando-dentate, rather pale on both sides, primary veins about 6-9 on each side, flower heads subtended by leaves or only bracts at their base (as in retusa), female flowers sessile, petals in the female ovate, in the male orbiculari-rhomboid all shortly unguicular, berry globoso-ellipsoid 3 lines long. *Wall. Cat.* 7882 ;—*DC. Prod.* xv. 500.

On the Concan ghats (Bombay), and probably Canara ; I have not met with this tree.

CLEISTANTHUS. Hook.

Gen. Char. Flowers monœcious or dicœcious. Calyx-segments valvate 5-parted at length deciduous, petals as many alternate with the segments of the calyx subsimilar in both sexes or rather different in form and a little larger in the female, disk urceolate adnate to the calyx-tube, margin free subentire crenulate or 5-lobed, the lobes alternate with the petals. Stamens 5 verticellate round the centre of a central column or slightly 3-cleft abortive ovary, ascending, anthers 2-celled introrse, ovary nearly hid in the disk 3-celled, cells 2 ovuled, styles 3 bifid shortly or to the middle, lobes stigmatose, capsule 3-coccous, shells 2-valved, seeds often connate in pairs ecarunculate without any aril, sparingly albuminous, testa thin crustaceous, cotyledons membranaceous thin, variously folded. *Hook. f. in Hook. Icon. Pl. t.* 779. (1848). Lebidiera, *Baill. etud. Gen. Euph.* Leiopyxis, *Miq. Fl. Ind. Bat. Supp. p.* 445.

* *Stipules small.*

1. Cleistanthus patulus, *Roxb.*—A small or middling sized tree, ramuli slender glabrous, stipules small, leaves submembraraceous ovate or oblongo-ovate cuspidately acuminate entire glabrous shining, 3-4 inches long by 1-1½ inches broad, petioles about 3 lines long, flowers nearly sessile, male and female mixed in the axillary heads, or (by the abortion of the leaves) on axillary (naked) spike-like branchlets, bracts ciliate, calyx segments oblongo-ovate, petals very small obovate unguiculate similar in both sexes, styles shortly bifid, ovary hairy, capsule about 4 lines in diameter, subglabrous or sparingly pilose 3-lobed. Cluytia patula, *Roxb. Fl. Ind.* iii. 733. Amanoa Indica, *Wight Icones* 1911.

This elegant little tree is not uncommon in dry subalpine jungles on both sides of the presidency ; the wood is exceedingly hard and durable and of a rose color.

Analysis, Pl. XXIII, fig. 4.

1. Inflorescence, portion of one of the naked spike-like branchlets.
2. Male flower bud, sepals valvate.
3, 4. Male flowers.
5. Calyx opened, shewing the disk, and 5 small petals.
6. The abortive style-like ovary with the 5 stamens verticelled round it above the middle of the column, apex slightly trifid.
7, 8. Anthers, front and back view.
9. Apex of the abortive style (trifid.)
10. One of the obovate unguiculate petals.
11. A bract.
21. Capsule slightly pilose. (Nos. 12 to 20, see under C. pallidus).

2. Cleistanthus robustus, *Thw.*—A small tree glabrous, ramuli angled glabrous, leaves ovato-lanceolate or subrotundate, sometimes very oblique at the base cuspidately acuminate, fuscous glabrous coriaceous, 2-7 inches long by 2-2½ inches broad, petioles about 4 lines long, stipules small, spike-like branchlets scarcely exceeding the leaves, flowers in interrupted heads often furnished with a small leaf at their base, male calyx fulvo-sericeous on the outside, segments triangulari-ovate, petals of the male flowers small obovate or spathulate albido-hispid, disk crenate, rudiment of ovary tricuspidate, fulvo-hirsute, capsule as in C. pallidus. Amanoa robusta, *Thw. MSS.* Cleistanthus, *DC. Prod.* xv. 504.

Ceylon, common in the plains about the south of the island.

3. CLEISTANTHUS FERRUGINEUS, *Thw.*—A small tree, the younger parts ferrugineo-pilose, stipules small, leaves subcoriaceous oblong obtusely rostrato-acuminate, glabrous above shining opaque beneath slightly pilose, veins and veinlets prominent, 2-5 inches long, petioles 2-3 lines long, flowers axillary glomerate ferrugineo-pilose, petals glabrous, rudiment of ovary subtrilobate, capsule stipitate ferrugineo-tomentose a little depressed 4 lines in diameter, stipe 1 line long. Amanoa ferruginea, *Thw. En. Pl. Zey.* 280. Cleistanthus, *DC. Prod.* xv. 508.

Ceylon, central provinces, up to 3000 feet elevation.

4. CLEISTANTHUS PALLIDUS, *Thw.*—A small tree, the young parts pale fulvo-pubescent, stipules small, leaves oblong lanceolate acuminate mucronate, acute at the base, glabrous above, a little hairy beneath, submembranaceous, $1\frac{1}{2}$-5 inches long by $\frac{3}{4}$-$1\frac{3}{4}$ broad, petioles 2-3 lines long, flowers axillary glomerate adpressedly albido-pilose, heads few-flowered, flowers large, calyx, &c. as in the genus, petals glabrous, rudiment of ovary tricuspidate, capsule subsessile, a little depressed, about 3 lines in diameter pale fulvo-pilose. Amanoa pallida, *Thw. En. Pl. Zey. p.* 280. Cleistanthus, *DC. Prod.* xv. 508.

Ceylon, Hanguranketty, near Kandy.

Analysis, Pl. XXIII, fig. 4.

12. Inflorescence.
13. A female flower bud.
14. Female flower.
15. Calyx of female flower opened, shewing disk and 5 small petals.
16. Ovary, 3-bifid styles.
17. The styles removed from the hairy ovary, shewing that they are slightly joined at the base.
18. A petal from the female flower.
19. Ovary cut transversely, 3-celled cells 2-ovuled.
20. Ovary cut vertically, ovules attached to centre of axis.

5. CLEISTANTHUS ACUMINATUS, *Thw.*—A small tree, glabrous, leaves elliptic, ovate or rotundate rostrato-acuminate glabrous, $1\frac{1}{2}$-3 inches long by 1-$1\frac{1}{2}$ inches broad, primary veins 5-7 on each side prominent beneath, petioles scarcely 2 lines long, flowers axillary sessile in crowded heads rarely on spike-like branchlets, pale glabrous, calyxes of both sexes equal scarcely 1 line long, white smooth, segments oblongo-triangular, petals oblong glabrous toothed at the apex, rudiment of ovary pubescent, the disk in the female flower shorter than the petals dentate or crenulate, ovary globose densely pubescent, capsule sessile a little depressed broader than long sparingly pilose. Amanoa acuminata, *Thw. En. Pl. Zey. p.* 428. Cleistanthus, *DC. Prod.* xv. 508.

Ceylon, Galle and Colombo.

* * *Stipules large equalling or exceeding the petals.*

6. CLEISTANTHUS MALABARICUS, *Mull.*—A small tree, ramuli rufo-villous at length glabrous, stipules 2-$2\frac{1}{2}$ lines long linear-lanceolate subulato-acuminate longer than the petioles, petioles scarcely more than 1 line long densely rufo-villous, leaves 3-5 inches long by 1-$1\frac{1}{2}$ inch broad obovato-lanceolate, shortly cuspidato-acuminate, above at length glabrous, beneath rufescenti-pubescent, primary veins 7-10 on each side often flexuose distant, flowers in sessile axillary few-flowered heads, calyx about 2 lines long glabrous, segments narrow lanceolate, petals narrow obovato-spathulate 3-lobed above, ovary furnished with longish fulvous hairs, fruit globose 3-celled fulvo-pilose. *DC. Prod.* xv. 508.

Malabar and Concan.

7. CLEISTANTHUS STIPULARIS, *Hook.*—A small tree or large shrub, young branches slightly tomentose, stipules tomentose lanceolate acuminate equalling the petioles and often tufted at the apex of the branches and then 3-5 lines long, petioles 2-3 lines long, leaves about 2 inches long by $1\frac{1}{4}$-$1\frac{1}{2}$ inches broad, ovate or ovato-elliptic obtuse and subcordate at the base glabrous above and opaque, griseo-tomentose beneath, flowers shortly pedicelled in axillary heads, calyx segments triangular ovate subtomentose on the outside, petals of the male unguiculate triangulari-obovate subentire puberulous on the back, disk very shortly free above crenate, rudiment of ovary 3-lobed. Briedelia stipularis, *Hook. et Arnt. Bot. Beech. p.* 211—(not *Linn.*) Cleistanthus, *DC. Prod.* xv. 509.

Nilgiris.

LEBIDIEROPSIS. MULL.

Gen. Char. The structure of the flowers exactly as in Cleistanthus, fruit capsular, seed ecarunculate exarillate not impressed at the hilum, sparingly albuminous, embryo straight, radicle short, cotyledons plane fleshy suborbicular.

This genus differs from Cleistanthus in its embryo and from Briedelia in its fruit.

1. LEBIDIEROPSIS ORBICULARIS, *Roth.*—A small tree, monœcious or rarely dicœcious, ramuli griseo-pilose, at length glabrous, leaves oval or suborbicular, generally 2-3 inches long by $1\frac{1}{2}$-2 broad, sometimes up to 5 inches long, glabrous in age or a little pubescent on the veins beneath, submembranaceous, petiole 2-4 lines long, flowers in subsessile axillary heads slightly pilose, male and female mixed or in separate heads, bracts several minute, calyx segments oblongo-triangular ovate, petals very minute, capsule nearly 1 inch long subglobose somewhat 3-lobed very hard glabrous, seed globose. Andrachne orbicularis, *Roth. Nov. Plant. Ind. or p.* 364. Lebidieropsis, *DC. Prod.* xv. 509. Cluytia collina, *Roxb. Fl. Ind.* iii. 732.

Very common in dry subalpine forests on both sides of the presidency; called Wodesha in Teligu (in the Circars), and Wodayu in Tamil (Palghat), also in Ceylon, where it is called Madara, and in Bengal; the wood is exceedingly hard and durable, of a

red color, very even grained, very easily worked ; it is much in use by the natives ; the outer shells of the capsules are said to be very poisonous.

Analysis, Pl. XXIII, fig. 5.

1. A branch bearing flowers and 1 fruit.
2. Inflorescence.
3. A flower bud, sepals valvate.
4. A full flower.
5. A flower open, shewing the structure just as in Cleistanthus, 1 petal removed and shewn separately.
6. Calyx opened out, shewing disk and petals.
7, 8. Anthers.

TRIBE CROTONEÆ.

CROTON. Linn.

For Gen. Char. see letter-press to Pl. cclxxxiii.

Sec. Eucroton.—*Calyx pentamerous, segments equal, petals in the male 5, male receptacle pilose.*

1. Croton scabiosum, *Bedd.*—For description, &c. see Pl. cclxxxiii.

2. Croton oblongifolium, *Roxb.*—A middling sized or small tree, young branches and the young leaves and inflorescence densely covered with silvery scab-like scales, leaves penniveined silvery-lepidote glabrous in age with a lateral depressed gland on each side at the base underneath, elliptic or oblong to ovate or obovate acute or acuminate serrate, crowded towards the apex of each branch, 6-12 inches long scarcely coriaceous, primary veins 16-20 on each side, petioles 1-1¾ inches long, stipules rigid subulate small, racemes terminal many flowered 2-6 inches long, bracts 1-3 flowered the male flowers above crowded, the female below distant, the female pedicels much thicker than the male, petals subulate woolly. Stamens 10-12, filaments woolly near the base, styles 3 each deeply bifid, segments entire or emarginate, slender variously flexuose. Capsule subglobose slightly 3-lobed lepidote about 3 lines long. *Roxb. Fl. Ind.* iii. 685 ;—*DC. Prod.* xv. 573.

A rather rare tree in our western forests, found also on our eastern mountains and widely distributed throughout Bengal and Birmah, also cultivated in native gardens.

3. Croton Malabaricum, *Bedd.*—A tree 20-30 feet high, the whole plant very silvery, leaves alternate oblongo-ovate, ovate to rhombeo-ovate acuminate, entire above, in age very sparingly covered with grey stellate scales or rarely quite glabrous, beneath very silvery and densely matted with scales, primary veins 6-7 on each side raised and prominent beneath, glands 2 very small immersed at the base on the underside, 2-6 inches long by 1-3 broad, petioles 1-2 inches long silvery but also with rusty scales. Stipules setaceous 6-9 lines long, racemes terminal solitary or 2-3 together about 2 inches long, the upper half male the lower half female silvery as are the flowers, disk of 5 lobes present in both sexes but very inconspicuous in the dense wool. *Male* : petals less than a third the size of the sepals woolly, stamens 10. *Female* : no petals, styles 3 each 2-cleft to nearly the base, the arms filiform blackish glabrous or subglabrous in age, fruit obovoid fusco-stellate, about 1 inch long by 8 lines wide, slightly raised above the calyx on a stalk 1 line long (base of the central column which runs up between the cocci and which is persistent after they fall off), fruiting calyx scarcely enlarged. *Bedd. Icones Part* x. *Pl.* clxxxi.

This tree is common in all our western forests up to 4000 feet elevation ; it has the same silvery appearance as reticulatum (hypoleucos, *Dalz*), but is a tree instead of a small shrub, has much larger leaves and very different glands, fewer stamens, larger fruit and different style ; it answers very exactly to Roxburgh's description of C. bicolor, except in its shorter racemes, but I dare not give it that name, as that species is from Sumatra only ; but I should not be surprised if it turns out to be identical with it.

4. Croton aromaticum, *L.*—is a very scabrous shrub or small tree (sometimes a creeper) most abundant throughout Southern India and in Ceylon ; with this I am inclined to join lacciferum, *L.*, and caudatum., *Geisel.* (drupaceum, *Roxb.*) I have most copious specimens from all parts of the peninsula and Ceylon, and I have quite failed in all attempts to separate them : the stamens vary from 10 to 30 on the same individuals, and the fruit varies much in size. C. Moonii, *Thw,* and C. nigro-viridis, Ceylonese shrubs or small trees, are not satisfactorily distinct, and should, I think, only be considered varieties.

5. Croton reticulatum, *Wall.*—is a small shrub with the leaves very white and silvery underneath, common in our western moist forests up to 4000 feet elevation ; from this I cannot distinguish C. Zeylanicum of DeCandolle, a Ceylon species.

6. Croton Klotzschianum, *Wight Icones* 1914.—A small tree or shrub, considered by DeCandolle as a variety of C. caudatum, is quite distinct. I have abundant specimens from South Canara, Coorg, Courtallum and the Nallay Mallays (Kurnool district), and with these C. Thwaitesianum, *DC.*, a Ceylon plant, quite agrees ; they have all of them 10 stamens, a 5-lobed inconspicuous disk present in both sexes, very filiform deeply cleft styles, and very inconspicuous filiform petals in the female or entirely wanting. As a species it is scarcely distinct from Croton tiglium, which I only have from Ceylon (Badagam), but the latter has larger and broader leaves and 12 stamens.

TRIBE ACALYPHEÆ.

ALEURITES. Forst.

For Gen. Char. see letter-press to Pl. cclxxvi.

Aleurites Moluccana, *Willd.*—For description, &c. see Pl. cclxxvi.

AGROSTISTACHYS. Dalzell.

Gen. Char. Male calyx regularly valvate, 3 or more rarely 4-parted, female calyx 5-parted imbricate, petals in the male double the number of the calyx-segments, in the female equal in number, glands of the disk equal in number to the petals alternate with them. Stamens generally 12 (rarely 8-13) joined at the very base into a ring and verticelled in 2 rows round the base of the 2-parted rudiment of an ovary, anther-cells free nearly to the apex, pendulous from the connectivum, unequally 2-valved. Ovary 3-celled, cells 1-ovuled, styles 3 connate at the very base bifid, the branches diverging and papillose, Capsule 3-coccous cocci bivalved. Shrubs or trees, dicœcious, leaves bistipulate alternate simple penniveined. Male flowers in supra-axillary spikes, female solitary from each head of bracts generally several arranged in a line along the stem above the axils. *Dalzel. in Hook. Journ. of Bot.* 1850 *p.* 41.

1. Agrostistachys Indica, *Dalz.*—A small tree up to 15 feet high, leaves subcoriaceous or coriaceous, 5-15 inches long by 1-6 inches broad, from narrow lanceolate elliptic to very broadly ovate, very coarsely serrated with the serratures incurved, or sometimes quite entire, margin much thickened, glabrous on both sides, primary veins very prominent and thick very variable in number, transverse veinlets also very prominent, petioles up to 2½ inches long, stipules ovato-lanceolate subulate acuminate striated soon deciduous, bracts broadly triangulari-ovate acute concave sericeous, petals obovate, connective obtuse produced beyond the anther-cells. Ovary hairy. *Dalz. l. c.*

Very common in our dense Ghat forests from Canara down to South Tinnevelly, 3-5000 feet elevation, also on the Bombay ghats, and in Ceylon 1-2000 feet elevation, and in Birmah and the Andamans.

Analysis, Pl. XXIII, fig. 2.

1. Male inflorescence, flowers in axillary spikes.
2. A male flower bud, sepals 3 valvate.
3. A male flower with the bracts at the base.
4. A full male flower, petals 6 (rarely 8) obovate, disk of 5 glands. Stamens 12 (sometimes 8-10-13) joined at the base into a ring and verticelled in 2 rows round the base of the 2-parted rudiment of an ovary.
5. Base of the stamens, shewing that they are connate into a ring.
6, 7. Anthers, front and back view, cells unequal divaricate subpendulous.
8. A petal.
9, 10. Female inflorescence, the flowers on the stems in a line above the axils, bracts 1 flowered.
11. Female flower bud with its bracts, sepals imbricate.
12. A full female flower, sepals 5, petals 5, alternate with the glands and sepals, styles 3 connate at the very base, each 2-lobed, ovary hairy.
13. Ovary cut vertically, shewing the ovules and young embryo, the former adnate to the centre of the axis.
14. Ovary cut transversely, cells 1 ovuled. (All drawn from living specimens.)

SARCOCLINIUM. Wight.

Gen. Char. Male calyx 5-parted valvate, female 5-4 parted imbricate, petals in both sexes alternate with the calyx-segments imbricate; disk present in both sexes 5-glandulose, the glands alternate with the petals, in the female eventually cohering together at the base, stamens 10 central biverticellate the 5 exterior opposite the petals, the 5 interior opposite the calycine segments, the filaments connate at the base, the column 3-2-cleft and style-like at the apex, anther-cells pendulous from the apex of the filament. Ovary 3-celled, styles 3 connate at the base 2-4-fid, ovary cells 1-ovuled, ovules pendulous, capsule 3-coccous, seed ecarunculate, embryo in the middle of copious albumen, cotyledons plane orbicular, radicle cylindric as long as the cotyledons. Small trees, leaves bistipulate large penniveined, entire or serrate, coriaceous, flowers dicœcious in axillary racemes. *Wight. Icones.* 1887-8.

1. Sarcoclinium longifolium, *Wight.*—A small or middling sized tree, very glabrous, stipules 1 line long, broadly ovate subcoriaceous deciduous, leaves rigid coriaceous narrow-obovato-spathulate, up to 1½ feet in length by 3½ inches broad towards the apex, terminating in a short very blunt point, quite entire glabrous, primary veins 16-19 very prominent beneath, impressed above, veinlets inconspicuous, petiole up to 2 inches long much compressed or winged, racemes erect shorter than the leaves (6-9 inches long) the male bracts 3-flowered, the female glanduloso-dentate 1-flowered, female pedicels articulate about the middle. Male calyx-segments entire, female glanduloso-denticulate, petals of male truncate and somewhat lobed at the apex, petals of female obovate, ovary pubescent, styles slightly connate at the base, capsule broad depressed tricoccous about 3-4 lines broad. *Wight l. c.*

Common in all our Western Ghat moist forests from Canara down to South Tinnevelly at 2-4000 feet elevation, also in Ceylon 4-6000 feet.

Analysis, Pl. XXIII, fig. 1.

1. Portion of a male raceme, bracts 3-flowered viscid.
2. A male flower bud, calyx segments valvate entire.
3. Male flower more advanced.
4, 5. Full male flowers, petals 5 alternate with the sepals truncate and lobed at the apex. Stamens 10 in 2 rows, the lower 5 free and opposite the petals, the upper 5 connate round the abortive ovary, disk of 5 glands alternate with the petals, apex of the abortive ovary 2-cleft.
6, 7. Anthers, front and back view, cells pendulous from the apex of the filament.
8, 9. Petals.
10. Portion of a female raceme, bracts 1-flowered viscid.
11. A female flower, calyx-sepals imbricate glanduloso-denticulate, disk of 5 glands alternate with the petals, petals crenulated but not so truncated as in the male. Styles 3 connate at the very base, 2-cleft at the apex.
12. Ovary cut vertically, cells 1-ovuled, ovules pendulous from near the apex of the axis.
13. Young fruit.
14. The styles removed, shewing that they are connate at the very base only. (All drawn from living flowers.)

2. Sarcoclinium Hookeri, *Thw.*—A middling sized tree, leaves glabrous rather coriaceous shining cuneato-lanceolate suddenly and finely acuminate serrulate penniveined, 2-3 feet long by 5-7 inches broad, primary veins 7-8 lines distant from each other parallel, petioles $\frac{3}{4}$-1 inch long, stipules lanceolate acuminate $1\frac{1}{2}$-$2\frac{1}{2}$ inches long striated fuscous, *female* racemes about as long as the leaves pendulous glabrous, pedicels solitary 5-6 lines long articulated below the middle, sepals triangular scarcely exceeding the large annular disk, ovary obtusely trigonal minutely tomentose, style short thick 3-parted from the middle, lobes stigmatose on the inside emarginate at the apex, the cocci of the capsule rounded. Seed spherical half an inch each way. Male flowers not seen. *Thw. En. Pl. Zey. p.* 279.

Ceylon, near Eknalagodde in the Ratnapoora district, called Mahabairoo.

CÆLODISCUS. Baillon.

Gen Char. Male calyx 4-5 parted valvate, female irregularly 3-5 fid, deeply open on one side, petals none. Stamens numerous inserted round a central glandulose concave disk, anthers introrse 2-celled, filaments free or irregularly and shortly polyadelphous, connective not produced, rudiment of ovary none, no hypogynous disk, ovary 5-3-celled. Styles 5-3 simple papillose on the inside. A genus with the habit of Mallotus, but differing in the presence of a central disk; the fruit is unknown.

1. Cælodiscus Thunbergianus, *Mull.*—A shrub or tree? ramuli terete compressed, smooth glabrous, the younger ones more compressed and sulcato-angulose slightly tomentose. Stipules small subulate, leaves opposite ovate acutely cuspidato-acuminate rounded at the base and slightly cordate or very shortly contracted and narrow, the young ones membranaceous pubescent with very short stellate hairs, in age glabrous above shortly aspero-puberulous on the costa and veins beneath, margin entire or very slightly crenulate or even repando-denticulate, furnished below with very minute shining glands, petioles unequal one being about 9 lines and the other only 3 lines long, racemes long peduncled, rachis slender ferrugineo-puberulous shorter than the leaves, flowers in distant fascicles, bracts short few-flowered. Male calyx a little more than 1 line long, when open narrowed at the base densely and shortly ferrugineo-tomentose. Stamens about 100, anthers apiculate, connective glandulose, filaments stoutish connate in bundles, central disk broad, female flowers and fruit unknown. *DC. Prod.* xv. 758.

Ceylon. I have never seen this plant, and it has not been found by Mr. Thwaites.

CEPHALOCROTON. Hochst.

For Gen. Char. see letter-press to Pl. cclxi.

§ Sec. Adenochlœna.—*No hypogynous disk. Stamens in a single verticel equalling in number the calyx segments.*

1. Cephalocroton Indicum, *Bedd.*—For description, &c. see Pl. cclxi.

2. Cephalocroton leucocephalum, *Baill.*—A shrub or small tree, all the young parts furnished with hoary stellate pubescence, leaves triangulari-ovate long cuspidato-acuminate, broadly subtruncate and cordate at the base, entire membranaceous, 2-4 inches long by $1\frac{3}{4}$-3 inches broad, petioles slender 2-$3\frac{1}{2}$ inches long, stipules cut down into filiform teeth, peduncles shorter than the petioles. Male flower heads $2\frac{1}{4}$-$3\frac{1}{4}$ lines broad. Male pedicels short, the calyx segments thick acute, rudiment of ovary quadrangulari compressed subcapitate at the apex, female calyx segments deeply laciniate much enlarged under the fruit, segments rigid compressed glandular, style column equalling the ovary, styles twice bifid, capsule $\frac{1}{2}$ an inch broad about 4 lines long deeply 3-lobed hoary. Seed globose smooth. *DC. Prod.* xv. 762.

Nilgiris. I have never found this species.

3. Cephalocroton Zeylanicum, *Baill.*—A suberect shrub sparingly branched, young parts clothed with white stellate pubescence, ramuli elongate weak, leaves oblongo-lanceolate acuminate broad at the base and truncate or subcordate 3-nerved, 3-7 inches long by 1-3 inches broad, petiole $\frac{1}{2}$-3 inches long, stipules subreniform. *Male* flowers small densely glomerate at the apex of the peduncle. Stamens 4-5, anthers extrorse, rudiment of ovary cylindric entire truncate; *female* flowers 1-3 at the base of the peduncle, segments 4-5 unequal lanceolate, in fruit much enlarged and pectinato-laciniate, the laciniæ long setaceous thickened at the apex, ovary pilose. Style 3-lobed large deciduous, lobes copiously and deeply laciniate, capsule 3-lobed a little depressed, cocci rotundate,

Coundo, del.

Dunphy Lith.

Calodiscus calycina (Bedd.)

See Manual under Euphorbiaceæ.

seed subspherical 2 lines in diameter marked with brown and black. *Baillon Rec. d'Obs. Bot. vol.* v. *p.* 148 ;—*DC. Prod.* xv. 762. Centrostylis Zeylanica, *Bail. etud. Gen. Euph. p.* 470. Adenochlœna Zeylanica, *Thw. En. Pl. Zey. p.* 270.

Ceylon, at Rambodde and Happootalle in the central provinces, at 4000-5000 feet elevation.

CÆLODEPAS. Hassk.

Gen. Char. Male calyx 3-4-fid valvate, female 4-5-10 parted imbricate, petals and disk none in either sex. Stamens 4-6 inserted round the rudiment of an ovary opposite the calyx lobes or the exterior alternate with them, anthers 2-celled, the cells distinct pendulous introrse, filaments thick, ovary 3-celled, cells 1-ovuled. Styles 3 broad deeply bilobed or sub-hexagynous, lobes multidentate. Capsule tricoccous, cocci bivalved. Seed ecarunculate albuminous. Trees, leaves alternate simple serrate often biglandular at the base. Male flowers on filiform spikes, female solitary, stipules serrate or pectinate. *Hassk. in Fl. Ratisb.* 1857, *p.* 531 ;—*DC. Prod.* xv. 759. Koilodepas, *Hassk. in Bot. Zeit. p.* 802.

1. Cælodepas calycinum, *Bedd.*—A small tree, young parts furnished with scurfy pubescence, stipules longer than the petioles pinnatifid, leaves alternate oblongo-lanceolate with a longish acumen, glabrous or subglabrous in age, when young sparingly furnished particularly on the costa and veins beneath with stellate scurfy tomentum, margins crenate sometimes furnished with 2 glands at the base on the underside, 3-7 inches long by $\frac{3}{4}$-$2\frac{1}{2}$ inches broad, penniveined, primary veins 8-11 on each side, petioles scurfy about 3 lines long. *Male* paniculate, spikes 3-4 inches long crowded or several together axillary or from the old axils or terminal, incano-pubescent, flowers very minute 3-8 in interrupted sessile heads. Calyx 4-cleft valvate hoary outside, petals 0. Stamens 4-5, filaments very flat contracted at the apex adnate for about $\frac{2}{3}$rds of their length to the fleshy base of the abortive ovary, free above, anther-cells divaricate, abortive ovary thick and fleshy below and adnate to the filaments produced above into a short 3-4 lobed column. *Female* flowers solitary axillary or above the axils pedicellate, the pedicel 3-4 lines long bracteate at the base, calyx 5-7 lobed imbricate stellately pubescent, disk and petals 0. Ovary pubescent 3-celled, cells 1-ovuled, ovules pendulous, styles 3-6 flat dilated 2-cleft plumose, capsule 6-8 lines in diameter surrounded by the much enlarged calyx, 3-lobed, the cocci rounded stellately pubescent. Adenochlœna, *Bedd. in distr.*

Paupanassum, and elsewhere foot of the Tinnevelly hills, called Kàtpira ; wood very hard. This will probably form a new genus between Cælodepas and Cephalocroton ; the male flowers are very minute.

For figure, vide tab. cccxx.

Analysis.

1. A stipule.
2. A male flower, sepals 4 valvate, stamens 4, filaments broad flat fleshy more or less monadelphous below and closely cohering to the fleshy base of a rudimentary ovary which is 4-lobed at the apex, free above and much attenuated at the apex, anthers introrse, cells pendulous distinct.
3. A male flower, sepals removed, the stamens pressed down to show that the filaments are adnate with the base of a 3-lobed rudimentary ovary $\frac{2}{3}$rds of the way up.
4. A male flower, sepals removed, shewing 5 stamens.
5. 2 of the stamens (separated from the fleshy base of the rudimentary ovary) inside view.

6, 7, 8. Female flowers, sepals 5 imbricate, stigmas 3-5 large flat 2-cleft.

9. Ovary cut vertically, ovules pendulous.
10. Ovary cut transversely, 3 cells each 1-ovuled.

11, 12. Young fruit, sepals much enlarged.

SYMPHYLLIA. Baillon.

Gen. Char. Male calyx 3-6 parted valvate, female 5-6-parted imbricate, petals and disk none in either sex. Stamens equal in number to and alternate with the calycine segments, inserted round the columnar rudiment of an ovary, anthers erect 2-celled introrse basifixed, filaments free. Ovary 3-rarely 2-celled, cells 1-ovuled, styles 3-2 shortly connate into a column divaricately spreading above, dense fimbriato-papillose on the inside ; fruit capsular, fleshy when young, mature fruit unknown. Shrubs, leaves crowded at the tops of the branchlets, often subverticelled minutely stipulate sessile or short petioled penninerved membranaceo-subcoriaceous minutely denticulate or entire, flowers monœcious in spike-like terminal panicles bearing a few female flowers at the base, or in the uppermost axils of the leaves. *Baillon Etud. Gen. Euph. p.* 473.

1. Symphyllia mallotiformis, *Mull.*—A small tree or shrub, leaves short petioled alternate, oblongo-elliptic acute entire, beneath scarcely paler and not punctato-glandulose, when young puberulous with minute stellate hairs, in age glabrous, 3-$4\frac{1}{2}$ inches long by 1-2 inches broad, not crowded at the apex of the branches, spikes a little shorter than the leaves, flowers in dense heads, male numerous shortly pubescent, female flowers and fruit unknown. *Mull. Arg. in Linnœa, vol.* 34. 156 ;—*DC. Prod.* xv. *p.* 764.

Nilgiris, southern slopes. I have never met with this plant ; it is said to be very like Mallotus Lawii, but has alternate instead of opposite leaves, and is destitute of the punctate glands beneath,

PODADENIA. Thw.

For Gen. Char. see letter-press to Pl. cclxxxii.

1. Podadenia Thwaitesii, *Baill.*—For description, &c. see Pl. cclxxxii.

TREWIA. Linn.

For Gen. Char. see letter-press to Pl. cclxxxi.

1. Trewia nudiflora, *Linn.*—For description, &c. see Pl. cclxxxi.

MALLOTUS. Lour.

For Gen. Char. see letter-press to Pl. cclxxxix.

Sec. Melanolepis.—*Disk present in the female flowers and sometimes in the male, connective obconical truncate.*

1. Mallotus barbatus, *Mull.*—A shrub or small tree, ramuli, the costa of the leaves and capsules densely covered with floccose tomentum, leaves peltate 3-lobed, lobes shortly triangular acute repando-denticulate, rotundato-obtuse at the base, 8 12 inches each way, above stellately pubescent, beneath stellately tomentose, subfloccose on the veins, petioles nearly as long as the leaves. Female flowers in simple elongated racemes, calyx 4-cleft, hypogynous disk short furnished with 1-8 stiff laciniæ which are thickened at the apex, capsule very densely and softly ferrugineo-echinate, exactly globose, equalling the pedicel in length, 3-4-coccous, about 4-5 lines in diameter. Seeds nearly 2 lines long ellipsoid subtuberculate shining, female flowers and fruit unknown. *Mull. Arg. in Linnæa vol.* 34. *p.* 184;—*DC. Prod.* xv. 957.

Concan ghats (Bombay), also in Birmah and Singapore, (unknown to me.)

Mallotus Molluccanus, *Linn.*—A small tree, young ramuli, young leaves and inflorescence densely covered with short subfloccose tomentum, at length glabrous, leaves alternate not peltate at the base elobate or subtrilobed, $2\frac{1}{2}$ to 6 inches long by not quite as broad, broad-rhomboid-ovate acuminate shortly contracted or subcordate at the base, mucronato-dentate with a cluster of small dark colored glands at the base on the upper side, more or less stellato-tomentose underneath, petioles a little shorter than the leaves, flowers monœcious or diœcious, racemes paniculate, the branches few elongate densely stellato-tomentose, bracts of both sexes 1-3-5 flowered, pedicels exceeding the calyx. *Male* calyx $1\frac{3}{4}$ lines wide, stamens about 200, the receptacle hemispherical stellato-pubescent, anthers with an obovate connective at the top. *Female,* the hypogynous disk urceolate thick stellato-pubescent crenate, ovary 2-celled, ovules pendulous, style 2-cleft, divisions recurvate. Capsule nearly $\frac{1}{2}$ inch wide densely subpulveraceo-stellato-tomentose. Seed globose foveolate of a dark brown, nearly 2 lines in diameter. Croton Moluccanus, *Linn. Sp. Pl. ed.* 1. *p.* 1005. Mallotus, *DC. Prod.* xv. 958. Croton multiglandulosum, *Reinw.* Rottlera, *Bl.* Melanolepis, *Reichenb.* Ricinus dicoccus, *Roxb. Fl. Ind.* iii. 690.

South Arcot, also in Java, Borneo, Timor and the Philippines.

3. Mallotus eriocarpus, *Thw.*—A shrub, ramuli, petioles and inflorescence rufo-tomentose with dense stellate hairs, leaves membranaceous opposite ovate to oblongo-lanceolate entire or a little undulate and crenulate, 3-nerved, beneath sparingly aureo-puncticulate, softly stellato-pubescent on both sides at length asperulous above, rounded or subcordate at the base, 2-8 inches long by 1-4 inches broad, petioles $\frac{1}{2}$-2 inches long. Male spikes half or scarcely half as long as the leaves bearing 5-10 flowered verticels, bracts small, male calyx conico-ovoid subacute, stamens about 40, connective not produced, ovary surrounded with numerous staminodes. Style-lobes 3 plumose on the inside, capsule tricoccous armed with numerous pilose soft aculei, cocci subspherical. Rottlera eriocarpa, *Thw. En. Pl. Zey.* 273. Mallotus, *DC. Prod.* xv. 959.

Ceylon, hot and drier parts of the island, not very common.

Sec. Eumallotus.—*Disk none, anthers introrse not truncate.*

* *Capsule softly echinate.*

4. Mallotus albus, *Roxb.*—A middling sized or small tree, young branches, petioles, young leaves and inflorescence densely covered with short rusty or whitish stellate tomentum, leaves a little peltate or epeltate, in age nearly glabrous above, very rusty beneath, broad-triangulari-ovate rarely lobate shortly acuminate, furnished with 2 or sometimes 3-4 glands at the base on the upper side, subentire or repando-denticulate, the leaf without the petiole 4-8 inches long by nearly as broad, palmate-nerved at the base penniveined above, petioles generally a little shorter than the leaves, inflorescence diœcious in terminal paniculate spikes very elongate and lax in the male, shorter and rather rigid in the female, bracts inconspicuous triangular ovate, male flowers in small sessile heads which are 3-many flowered, female flowers solitary and larger. Male calyx 3-4 or rarely 5-parted, stamens about 80, female calyx unequally 4-5 parted deeply connate. Ovary 4-celled densely ferrugineo-stellato-tomentose at length softly echinate, the echini stellato-floccose, stigmas flat nearly 3 times as long as broad very papillose, capsules subsessile tetracoccous about 4 lines broad. Rottlera alba et tetracocca, *Roxb. Fl. Ind.* iii. 829 *and* 826. Mallotus alba, *DC. Prod.* xv. 965. Rottlera peltata, *Wight Ic.* 1873. Rottlera mappoides, *Dalz. in Hook. Journ. of Bot.* 1851.

Very common throughout our western forests, Mysore, &c. up to 4000 feet elevation, also in Ceylon (called Bookanda) and in North India, Sumatra and Borneo. I do not know Mallotus Roxburghianus, *DC.* (Rottlera peltata, *Roxb.*), and if distinct from this (it is described as having racemes instead of panicles and linear subulate bracts), it is not a South Indian tree. Wight's Rottlera peltata, referred by DeCandolle to M. Roxburghiana, certainly belongs to the plant here described.

5. Mallotus muricatus, *Wight.*—A large shrub or small tree, diœcious, young parts densely covered with ferrugineous resinous little disks and sparingly and shortly puberulous, but soon destitute of hairs, petioles opposite often very unequal in length up to $1\frac{1}{2}$ inches long, leaves up to 10 inches long by 4 broad but not generally quite as large, lanceolato-elliptic to ovato-elliptic with a long acumination repando-dentate, rigidly membranaceous, beneath densely glanduloso-punctate, and furnished near the base on the

upper side with 2-4 large glands, penniveined, primary veins very prominent, flowers spicato-racemose, female racemes elongate terminal soon becoming lateral by the further development of branches, male amentiform longer than the petioles, bracts short broad concave, male calyx globose, segments 3 suborbicular, segments of female calyx narrow-lanceolate slightly connate at the base, stamens about 50, ovary globose muricato-echinate, echini soft pilose, style-column very short. Capsule 3-coccous each armed with 2 rows of excrescences. Claoxylon muricata, *Wight Icones* 1886. Axenfeldia intermedia, *Baill. Etud. Gen. Euph. p.* 419. Rottlera muricata, *Thw. En. Pl. Zey. p* 273.

Very common in the moist forests of our Western Ghats from Canara down to South Tinnevelly.

6. Mallotus stenanthus, *Mull.*—A large shrub or small tree, petioles opposite unequal, leaves lanceolate acuminate acute at the base repando-denticulate or entire rigidly membranaceous, beneath resinoso-puncticulate subglabrous, furnished with several glands at the base on the upper side, racemes of the male axillary short, bracts small ovate, flowers nearly sessile, calyx oblongato-ellipsoid glandular, segments 3 narrow elliptic, stamens 18-20, female flowers and fruit unknown. *DC. Prod.* xv. *p.* 972.

Bombay ghats, &c. (unknown to me.)

7. Mallotus micranthus, *Mull.*—A shrub or small tree, ramuli and petioles obscurely fulvo-pubescent at length glabrous, petioles ½-1 inch long opposite and alternate, leaves 3-5 inches long 1-2 inches broad, elliptic lanceolate subentire sparingly glanduloso-punctate below, rigidly membranaceous glandularly maculate at the base above, the costa beneath pubescent, primary veins 4-5 on each side, male racemes terminal and axillary much shorter than the leaves densely flowered, bracts lanceolate acuminate small few flowered, calyx globose tomentose only ½ a line long, stamens about 50, connective very obtuse rather prominent, female flowers and fruit unknown. *DC. Prod.* xv. 971.

Ceylon. Differs from muricata, stenanthus and Lawii (to which it is allied) by its very much smaller flowers ; the primary veins are also much fewer, (unknown to me.)

8. Mallotus aureo-punctatus, *Dalz.*—A shrub or small tree, young parts puberulous, leaves opposite penniveined lanceolato-elliptic acuminate glabrous and shining above, furnished beneath with a few stellate hairs on the costa and numerous golden resinous dots over the whole surface, 2½-6 inches long by 1-1½ broad, furnished with 3-7 glandular black dots at the base on the upper side, primary veins 8-9 on each side, the lower ones much shorter, petioles generally unequal in length, 3-5 lines, flowers racemose golden dotted, racemes simple axillary and terminal shorter than the leaf. Male flowers fascicled about 5 together, calyx 4 divided, segments broadly ovate reflexed, female racemes 4-5 flowered, calyx spathaceous split on one side, capsule 9 lines in diameter clothed with soft hairy bristles. Rottlera aureo-punctata, *Dalz. in Hook. Journ. of Bot.* iii. 122. Mallotus, *DC. Prod.* xv. 973.

Anamallay forests, Bombay ghats.

9. Mallotus Lawii, *Mull.*—A small tree or large shrub, branches slender obscurely fulvo-puberulous at the apex, petioles opposite 2-3 lines long puberulous, leaves about 4 inches long 1-1½ inches broad, elliptic or obovato-lanceolate often subfalcate cuspidate at the apex, repando-denticulate furnished with black spots at the base, in age glabrous aureo-puncticulate beneath, penniveined, the lower veins shorter, flowers diœcious spicato-racemose, racemes axillary long, the male bracts 3-7 flowered, the pedicels fasciculate articulated at the apex puberulous. Calyx about 1 line long acute pubescent 3 parted, stamens 50-60, connective obtuse or apiculate a little exceeding the anthers, female racemes few flowered, bracts ovate acute. Calyx spathaceous at length deeply 1-2 parted, ovary densely echinate with longish soft hairy weak bristles, the style-column very short. *DC. Prod.* xv. 974.

Malabar and Concan. Very similar to muricatus and stenanthus, but the female calyx spathaceous and the style-column shorter. I have never found this species.

* * *Fruit unarmed.*

10. Mallotus distans, *Wall.*—A straggling weak shrub, young branches, petioles and inflorescence densely clothed with short soft greenish stellate tomentum, petioles opposite very unequal, ¾ to 2 inches long (one of them generally twice as long as its fellow), leaves membranaceous 3-nerved, 3-7 inches long by 2-3½ broad ovate or rhomboido-ovate, generally acute at the apex, very slightly peltate at the base, and there furnished on the upper side with 2-6 large black glands, in age glabrous above, beneath softly and densely stellato-pubescent and often minutely and inconspicuously aureo-puncticulate, bracts linear, *female* racemes as long or longer than the leaves slender drooping 3-6 flowered, flowers distant solitary pedicelled, pedicels about 3 lines long, (or elongate ?) *male* spikes as long as the female racemes with distant sessile 4-10 flowered heads or fascicles each subtended by a single bract, female calyx 3-5 parted, ovary densely and softly stellato-tomentose. Capsule 3-lobed 4-5 lines in diameter stellately-fulvous. Croton distans, *Wall. Cat.* 7772*A*. Mallotus, *Mull* ;—*DC. Prod.* xv. 976.

Tinnevelly district, foot of the ghats. I have only found this species near Courtallum (the 5 falls).

11. Mallotus Zeylanicus, *Mull.*—A shrub or small tree, young parts clothed with stellate pubescence, leaves opposite or alternate ovate or elliptico-lanceolate acuminate entire or slightly repando-denticulate glandulosely maculate at the base, subglabrous or beneath pubescent on the costa and veins, rigidly-membranaceous, penniveined, or subtriplinerved, 2-6 inches long by 1-3 inches broad, petiole ½-1½ inch long. Male racemes spiciform stellately tomentose. Male bracts triangular very short. Stamens 30-40, connective not produced beyond the anthers, the female bracts ovate, female calyx 3-4-parted, ovary tomentose, style-column indistinct, capsule depressed 3-4-lobed about 4 lines in diameter unarmed, shortly stellato-tomentose, seed globose smooth. *DC. Prod.* xv. 977. Rottlera oppositifolia, *Thw.* (not *Bl.*)

Ceylon, not uncommon up to 2000 feet elevation.

12. Mallotus atrovirens, *Wall.*—A shrub or small tree, petioles opposite 1-4 lines long, leaves penniveined 3-4½ inches long by 1-2 inches broad, lanceolato-obovate obtuse acute at the base, epeltate, beneath densely subferrugineo-glanduloso-punctate, above dark-brownish and glanduloso-punctate, racemes axillary, female calyx 5-parted, divisions linear-lanceolate acute, the pedicels exceeding the calyx. Male calyx globose 1 line broad glanduloso-punctate, stamens about 40, connective narrow not produced. Ovary smooth glabrous but densely covered with glands, stigma recurved spreading very papillose. Croton atrovirens, *Wall. Cat.* 7771. Mallotus, *DC. Prod.* xv. 978.

Courtallum, Tinnevelly district. (I have not found it.)

13. Mallotus fuscescens, *Thw.*—A small tree, glabrous, the young parts and inflorescence furnished with gland-like dots, petioles opposite ½ to 1½ inches long, leaves 2½-6 inches long by 1-3 inches broad, oblongo-obovate acute epeltate at the base subentire rather coriaceous glanduloso-punctate on both sides, penniveined obscurely biglandular at the base, racemes spiciform simple terminal or from the upper axils, the male up to 1 inch long, densely flowered, calyx ovoid acute, stamens 20-25, the female a little longer many flowered, bracts very small ovate, calyx 5-parted, segments lanceolate acuminate a little longer than the male, ovary glabrous glandulose, style-column indistinct, stigmas short, capsule 4 lines broad deeply 3-lobed or sometimes 4-lobed unarmed punctato-glandulose glabrous. Seed 2 lines long subglobose smooth shining. Rottlera fuscescens, *Thw. En. Pl. Zey.* 273. Mallotus, *DC.* 978.

Ceylon, up to 2000 feet elevation.

14. Mallotus nitidus, *Mull.*—Shrub or small tree, all the young parts fulvo-puberulous soon glabrous, ramuli terete, stipules triangulari-ovate acuminate small very caducous, petioles 2-3 lines long, leaves alternate, 3-4 inches long by 1½-2 inches broad penniveined, lanceolato-obovate slightly coriaceous minutely repando-denticulate furnished with 1-2 glands at the base without resinous dots. Male spikes from the upper axils slender, flowers in interrupted heads, bracts very short broad, stamens about 80, connective broad produced, calyx subsericeo-pubescent ovoid acute, female flowers and fruit not known. *DC. Prod.* xv. *p.* 979.

Ceylon. I have never seen this species; it has the habit of fuscescens.

15. Mallotus rhamnifolius, *Willd.*—A shrub or small tree, ramuli, petioles and inflorescence softly subvelutinous at length subglabrous, petioles about 5-6 lines long, leaves alternate submembranaceous, 2-3½ inches long by 1-2 inches broad, lanceolato-ovate acuminate subcordate or obtuse at the base slightly repando-dentate, beneath furnished with shining golden glands, shortly 3-nerved, racemes spiciform 2-3 times as long as the leaves, many-flowered, female calyx small 2-3 parted, the segments somewhat cohering, stigmas short thick, capsule small about 2 lines broad depressed deeply 3-lobed ferrugineo-tomentose. Croton rhamnifolius, *Willd.* Mallotus, *DC. Prod.* xv. 979. Croton nervosus, *Rottl. et Willd.* C. reticulatum, *Willd. Sp. Pl.* 4. 545.

Southern India. I have never found this; it has the habit of Zeylanica, but with alternate leaves.

16. Mallotus Philippinensis, *Lam.*—For description, &c. see Pl. cclxxxix.

17. Mallotus repandus, *Willd.*—A sub-scandent shrub or small tree, young ramuli, petioles and inflorescence stellately fulvo-tomentose, leaves slightly peltate triangularly or broad rhomboid-ovate acute repando-denticulate, up to 4 inches long and often quite as broad or even broader, subglabrous above, stellately tomentose beneath or at length glabrous and furnished with waxy glands, petioles ¾ to 1¾ inches long, spikes terminal panicled often longer than the leaves, bracts triangular-ovate, the male 3-flowered, the female generally 1-flowered. Male calyx globose about 1 line broad shortly pedicelled furnished with pale glands inside. Stamens about 50, female calyx cylindrico-ellipsoid when young, segments ovate at first deeply gamosepalous, at length narrow lanceolate deeply cleft, stigmas papillose. Capsule about 5 lines broad a little exceeding the pedicel, glandular dicoccous pulveraceo-tomentose, seed 2 lines long globose reticulated. Croton repandus, *Willd.* Mallotus, *DC. Prod.* xv. 981. Croton rhombifolius, *Willd. Sp. Pl.* iv. 555. Rottlera dicocca, *Roxb. Fl. Ind.* iii. 829.

Not uncommon throughout the presidency and in Ceylon and Bengal, also in Birmah, Java, the Philippines, Timor, Formosa, New Caledonia and Hong Kong.

CLEIDION. Blume.

For Gen. Char. see letter-press to Pl. cclxxii.

1. Cleidion Javanicum, *Bl.*—For description, &c. see Pl. cclxxii.

Generally diœcious as described and figured, but I lately found a tree monœcious.

MACARANGA. Pet. Thouars.

For Gen. Char. see letter-press to Pl. cclxxxvii.

Sec. I. Pachystemon.—*Anthers all 3-celled at the base, 3-valved. Ovary 6-4-celled.*

1. Macaranga depressa, *Mull.*—A tree, stipules oblongo-triangular from a broad base reflexed subpersistent, petioles about 4-5 inches long, leaves broadly peltate very unequally 3-5-lobed coriaceo-membranaceous, beneath sparingly waxy glandulose,

the margins glandular, panicles shorter than the leaves, the female with few branches, bracts oblongo-ovate acuminate entire, female calyx 3-lobed, segments rotundate obtuse, ovary 5-4 celled obtusely gibbous depressed resinoso-granular. *DC. Prod.* xv. 989.

Ceylon. I have never seen this species.

Sec. II. MAPPA.—*Anthers* 4-*valved (very rarely one or two with* 3 *valves), ovary* 2-*celled* (*or occasionally with* 3 *cells.*)

1. MACARANGA DIGYNA, *Wight.*—A small tree, branches slender, young parts slightly scurfy soon glabrous. Stipules 2-3 lines long linear subulate, leaves 4-6 inches long by 1-2 broad lanceolate, long cuspidato-acuminate, obtuse or slightly cordate at the base and there furnished with 2 glands on the upper side submembranaceous, penniveined, repando-denticulate densely glandulose beneath with minute waxy dots, petioles 1-2 inches long, bracts small acute subulato-bistipulate diœcious, racemes spiciform simple slender generally much shorter than the leaves, (the female sometimes elongated longer than the leaves and bearing a few very small leaves), the male flowers in tiny heads 3-5 together nearly sessile in the axils of the bracts less than $\frac{1}{2}$ a line in diameter, calyx 3-parted glandular, anthers 10-15, filaments glabrous, the female flowers solitary or 2-3 together, calyx 3-4-parted, the segments triangulari-lanceolate acute spreading, ovary 2-lobed densely granuloso-grandular and puberulous more or less echinate, stigmas 2 very long slender acute, subglabrous, capsule $2\frac{1}{2}$ lines in diameter covered with waxy glands and a few sharp black aculei. Claoxylon digynum, *Wight. Icones* 1884. (Stamens too numerous). Rottlera digyna, *Thw.* Mallotus, *DC. Prod.* xv. 1007. Mappa digyna, *Mull. in Linnœa*, 34. 198.

Ceylon, very common about Badagam near Galle, and elsewhere in the plains at the south of the island.

Sec. III. EUMACARANGA.—*Anthers all* 4-*celled. Ovary* 1-*celled.*

* *Stamens* (5) 3.

2. MACARANGA TOMENTOSA, *Wight.*—For description, &c. see Pl. cclxxxvii.

3. MACARANGA PELTATA, *Roxb.*—A tree, leaves alternate orbiculari-ovate shortly acuminate peltate entire glabrous above a little tomentose beneath, 6-9 inches long by 4-5 inches broad, stipules obliquely oblong caducous, petioles 1-2 inches long, bracts denticulate. *Male* panicles thin axillary erect interrupted, flowers very minute, bracts 2 lines long rhombeo-ovate or rhombeo-obovate many flowered. Calyx-segments ovate crenate acuminate, stamens 3, filaments free. *Female* racemes axillary simple erect, bracts broad lanceolate 1-2 flowered, calyx as in the male, ovary incurved globular glanduloso-punctate. Osyris peltata, *Roxb. Fl. Ind.* iii. 755. Macaranga, *DC. Prod.* xv. 1010. Macaranga Roxburghii, *Wight Icones tab.* 1949. *fig.* iv. *and t.* 817. M. Wightiana, *Baill. etud. Gen. Euph.* 432.

Mountains on the east side of the presidency. I have never met with it (if distinct from the last.)

4. MACARANGA FLEXUOSA, *Wight.*—A tree, male panicles flexuose, flowers 3-5-androus, bracts at the forks of the panicles foliaceous coarsely serrate rhombeo-ovate acuminate, those at the glomerules glanduliferous triangulari-lanceolato-linear. Male calyx segments orbiculari-elliptic entire. *Wight Icones* 1949, *fig.* 3.

Tinnevelly jungles. I do not know this tree, unless it is, as I suspect, only a variety of M. tomentosa.

Stamens 8-5.

5. MACARANGA INDICA, *Wight.*—A tree, branches glabrous, stipules triangulari-ovate glabrous glaucescent somewhat scariose, petiole about as long as the leaf, leaves densely tomentose when young, 5-6 inches long, orbiculari-ovate acute or very shortly cuspidato-acuminate broadly peltate at the base, subentire or serrated at the margins, in age above glabrous, beneath glaucescent and sometimes subglabrous, glandular with waxy dots, furnished on the upper side near the insertion of the petiole with several large impressed glands, male and female flowers in panicles. Male bracts petioled elliptic covered with a large elliptic shining disk-like gland, female bracts linear-lanceolate without glands, stigma ascending sub-linear acute flexuose, male calyx-segments obovate. Stamens 6-8, filaments monadelphous at the base. Capsule covered with resinous points. *Wight Icones tab.* 1883.

Very common throughout the western forests of this Presidency, also in the Khasya hills.

Analysis, see Pl. cclxxxvii.

1. Male inflorescence.
2. A male flower with 5 stamens.
3. A male flower with 7 stamens.
4. A male flower bud.
5. A stamen, anther 4-celled.
6. Female inflorescence.
7. Female flower opened.
8. Ovary cut vertically 1-celled (the erect ovule is probably a mistake.)
9. Ovary cut transversely. (Drawn from dried specimens.)

HOMONOYA. LOUR.

Gen. Char. Male calyx 3-parted valvate, female 5-parted imbricate, petals and disk none in either sex, stamens very numerous polyadelphous central connate below, crowded and polyandrous at the apex, the central ones sometimes without anthers, anthers 1-celled adnate opening by a short slit, subglobose, rudiment of ovary none. Ovary 3-celled (rarely 4-celled), cells 1-ovuled.

Styles equalling in number the cells of the ovary simple narrow densely papillose shortly connate at the base. Capsule tricoccous, seed ecarunculate smooth spuriously membranaceo-arillate. Shrubs, leaves alternate bistipulate penniveined entire or toothed subcoriaceous, inflorescence axillary often unisexual. Male flowers spiked, females spicately racemose, bracts generally 1-flowered. *Lour. Fl. Cochinch. p.* 637. Spathiostemon, *Bl. Bijd. p.* 621. Lamanaja, *Blanco.* Hæmatospermum, *Wall.* Adelia, *Roxb ;—Wight.*

1. Homonoya riparia, *Lour.*—A large shrub, ramuli pubescent or glabrous, petioles 2-3 lines long, leaves densely lepidote beneath narrow linear-lanceolate acuminate entire or glanduloso-denticulate, 4-6 inches long by $2\frac{1}{2}$-5 lines broad, flower-spikes elongate many flowered, much shorter than the leaves, erect slender. Male calyx about 1 line broad globose puberulous, female calyx scarcely larger, segments ovato-lanceolate persistent, stigmas longer than the capsule, shortly papillose; ovary and capsule occasionally muricate. *Lour. Fl. Cochinch. p.* 637. Croton salicifolius, *Geisel.* Adelia neriifolia, *Roxb. Fl. Ind.* iii. 849 ;—*Wight Icones tab.* 1868. Hæmatospermum Javanense, *Bl.* Hæmastospermum, *Wall.*

Very common in the plains of India, Ceylon and Birmah, in beds of rivers; also in Java ,the Philippines, Cochin China and the Andamans.

Analysis, Pl. XXIV, fig. 1.

1. Male inflorescence.
2. Male flower bud.
3. Male flower.
4. Portion of a column of stamens.
5. A smaller portion very highly magnified.
6. An anther.
7. Female inflorescence.
8, 9. Female flowers.
10. Calyx opened out, a bract visible behind.
11. Ovary cut transversely, 3 cells each 1-ovuled.
12. Ovary cut vertically, ovules pendulous.
13. Magnified style. (Drawn from living specimens.)

2. Homonoya retusa, *Wight.*—A small shrub, leaves alternate sessile or subsessile cuneato-obovate to lanceolato-spathulate crenato-dentate, apex retuse or rounded or truncate, slightly lepidote beneath, 1-$1\frac{3}{4}$ inches long, racemes axillary much shorter than the leaves 2-3 flowered, calyx of the female with the segments ovate, deciduous, stigmas about $\frac{1}{2}$ as long as the capsule papillose. Ovary and capsule smooth. Adelia retusa, *Wight Icones* 1869. Homonoya, *Mull. ;—DC. Prod.* xv. 1022.

Not uncommon in beds of rivers on both sides of the presidency, also in Bombay.

TRIBE HIPPOMANEÆ.

TRIGONOSTEMON. Bl.

For Gen. Char. see letter-press to Pl. cclxxiii.

Sec. I. Dimorphocalyx.—*Male calyx shortly 5-toothed, female 5-parted, petals and disk present in both sexes. Stamens in* 3-2 *verticels, anthers introrse.*

1. Trigonostemon Lawianus, *Nimmo.*—For description, &c. see Pl. cclxxiii.

Sec. II. Cheilosopsis.—*Male calyx 5-parted, petals present, disk present in both sexes, stamens in* 3-2 *verticels, anthers extrorse.*

2. Trigonostemon Zeylanicus, *Mull.*—A shrub or small tree, ramuli rather slender terete, the apex together with the very young leaves stellately puberulous, in age glabrous. Stipules 2 lines long linear-lanceolate very caducous, petioles 1-$1\frac{1}{2}$ inches long, leaves membranaceo-coriaceous elliptic or nearly linear-lanceolate long-acuminate, glanduloso-serrulate at the margin reticulato-venose, 5-8 inches long by 1-2 inches broad; flowers in simple spicate racemes as long as the leaves, female calyx nearly 2 lines long, the segments orbiculari-elliptic tomentose, the 3 outer ones tubercled and thickened at the back above, petals broad ovate glabrous, hypogynous disk urceolate entire glabrous on the outside, the inside and the margin ferrugineo-sericeous. Ovary ovoid a little acute sericeous. Style-branches free to nearly the base. Male flowers and fruit unknown. *DC. Prod.* xv. 1106. Tritaxis zeylanica, *Mull. Arg. in Flora Ratisb.* 1864 *p.* 482.

Ceylon. I have never seen this, and it is not mentioned by Mr. Thwaites.

Sec. Eutrigonostemon.—*Calyx of both sexes* 6-5-*parted, petals and disk present in both sexes, stamens* 3-2 *in a single verticel, anther cells diverging.*

3. Trigonostemon diplopetalus, *Thw.*—A small tree or shrub, young parts and inflorescence sparingly pilose, leaves subglabrous penniveined, 6-9 inches long by $1\frac{1}{2}$-$2\frac{3}{4}$ inches broad, lanceolate mucronate distantly denticulate, cuneate at the base, petioles $\frac{1}{2}$ inch long sulcate above denticulate at the apex. Stipules minute subulate caducous, racemes many-flowered terminal shorter than or rarely equal to the leaves, floriferous from the base, bracts very small triangular ovate fulvo-sericeous. Calyx-segments denticulate, petals glabrous reddish deeply bifid, lobes rounded laciniato-sinuate undulate, glands of the male disk free, connective thick tuberculate, male pedicels $1\frac{1}{2}$-2 lines long, female pedicels thickened above, 4-5 lines long, in fruit 6-7 lines. Style lobes 3 short twice bifid, capsule 3-lobed a little depressed $\frac{1}{2}$ inch broad pilose. *Thw. En. Pl. Zey.* 277 ;—*DC. Prod* xv. 1108.

Ceylon, Palahattoo in the Reigam Corle at no elevation.

4. Trigonostemon nemoralis, *Thw.*—A shrub or small tree, the young angled ramuli, the young leaves and inflorescence sericeo-pubescent soon glabrous, stipules subulate 2-3 lines long subpersistent, petioles 2-3 lines long pubescent bidenticulate at the apex, leaves penniveined subglabrous, 3-6 inches long by 1-1¾ inches broad, lanceolate acuminate mucronulate crenato-denticulate, racemes many flowered shorter than the leaves floriferous from the base, the flowers and pedicels about equal in length, petals 5-6 dull red oblong entire 2-3-times larger than the unequal lobes of the calyx, anthers 3-2, the cells subparallel a little distant at the apex of the rounded connective, female flowers a little larger than the male 6-7 lines in expansion. Ovary hispid. Style-lobes 3 short spathulate emarginate reflexed, capsule nearly ½ inch in diameter muricate pilose of 3 rounded cocci. Seed spherical 3 lines in diameter a little keeled on the back, testa smooth marbled. *Thw. En. Pl. Zey. p.* 277;—*DC. Prod.* xv. 1108;—*Bedd. Icones Plant. part* x. *Pl.* clxxxiii.

Tinnevelly mountains south of Courtallum, common in the moist forests at 2000-3000 feet elevation (Ayen Covil pass, banks of the Garna river, &c.); Ceylon, central provinces, 2000 feet elevation.

GIVOTIA. Griff.

For Gen. Char. see letter-press to Pl. cclxxxv.

1. Givotia rottleriformis, *Griff.*—For description, &c. see Pl. cclxxxv.

OSTODES. Bl.

For Gen. Char. see letter-press to Pl. cclxxiv.

Sec. Euostodes.—*Anthers introrse.*

1. Ostodes Zeylanica, *Thw.*—For description, &c. see Pl. cclxxiv.

CODIÆUM. Rumph.

Gen. Char. Calyx of both sexes 5-(rarely 3-) parted imbricate, disk present in both sexes, petals alternate with the calycine segments and with the glands of the disk present in both sexes or rudimentary or absent in the female. Stamens central inserted on an elevated receptacle various in number, filaments free or connate in a column, anthers 2-celled, rudiment of ovary none. Ovary cells 1-ovuled. Styles 3-4 equal in number to the cells of the ovary, simple terete connate at the base, or bifid or bipartite. Fruit capsular. Trees or shrubs, leaves opposite or alternate penniveined entire. Flowers monœcious, inflorescence terminal or axillary racemiform or umbellate bisexual or unisexual. *Rumph. Amb. vol.* 4, *p.* 65. Blackia, *Baillon.* Phyllaurea, *Lour. Fl. Cochinch.* Baloghia, *Endlich. Prod. Fl. Norf. p.* 84. Sinospisma, *End. Gen. Plan. n.* 5775. Tylosepalum, *Sulp. Kurz.* Junghuhnia, *Miq. Fl. Ind. Bat.* 1. *part* 2, *p.* 412. Crotonis sp, *L.*

Sec. Blackia.—*Male calyx* 4-5-*parted, female* 5-6-*parted. Male petals small. Female petals rudimentary. Stamens* 10-40 *in many series, styles bifid, Flowers monœcious umbelled, disk present in both sexes. Ovary* 3-4-*celled, style branches subutate.*

1. Codiæum umbellatum, *Willd.*—A shrub or small tree, branches dichotomously branched, leaves rather rigid membranaceous, 2-6 inches long by 1-2½ inches broad, lanceolato-obovate or elliptico-lanceolate obtusely cuspidato-acuminate, primary veins 7-9 on each side, petioles 2½-6 lines long, flowers in both sexes umbelled, peduncles elongate slender, male pedicels 2½-6 lines long filiform flaccid, female ½-1 inch long, thickened near the apex, male calyx globose 1 line broad, male petals truncato-obovate 3 times shorter than the calyx, stamens 10-15, disk in the male 4-5 glandulose, female calyx larger than the male at length increasing in size and coriaceous, ovary smooth glabrous. Styles slender, female disk urceolate. Croton umbellatum, *Willd. Sp. Pl.* iv. 545;—*Wight Icones. tab.* 1874. Blackia umbellata, *Baillon.*

Common in all our Western Ghat moist forests up to 3000 feet, also in Ceylon.

Analysis, Pl. XXIII, fig. 6.

1. Male inflorescence.
2. Male flower buds, sepals imbricate.
3. Full male flower, sepals 4 (sometimes 5), petals 4 (sometimes 5) alternate with the sepals, disk of 4 (5) large glands, opposite the sepals. Stamens 16 central, pluriserial.

4, 5. Anther, front and back view.

6. Female inflorescence.

7, 8. Female flowers, calyx 5-(6-) parted imbricate, disk urceolate, styles 3 bifid subulate connate at the base.

9. Ovary cut vertically, ovules pendulous.
10. Ovary cut transversely, cells 3 each 1-ovuled.
11. A valve of the capsule.
12. The seed, shewing its caruncle.

CHÆTOCARPUS. Thw.

For Gen. Char. see letter-press to Pl. cclxxxiv.

1. Chætocarpus castanocarpus, *Roxb.*—For description, &c. see Pl. cclxxxiv.

2. Chætocarpus coriaceus, *Thw.*—A middling sized tree, ramuli subglabrous, leaves very coriaceous glabrous oblong shortly acuminate smooth above, sparingly venose beneath, acute at the base, 3-6 inches long by 1½-3 inches wide, petioles 3-5 lines long, fascicles many flowered minutely tomentose, flowers 1-1½ lines long, filaments pilose. Capsule ovoid obscurely trigonous apiculate muricate sparingly strigose, 8 lines long, putamen bony. *Thw. En. Pl. Zey. p.* 275.

Ceylon, in the Ratnapoora and Ambagamwa districts, very similar to No. 1, but the leaves are much more coriaceous and the capsule very different. The timber is hard and in use for building purposes. For drawing of the fruit and its analysis see Pl. cclxxxiv.

GELONIUM. Roxb.

Gen. Char. The calyx-segments imbricate often unequal, in both male and female, petals none, disk in the male extra-staminal (often suppressed), stamens generally numerous (rarely only 6) occupying the centre of an elevated disk which is sometimes furnished with glands, filaments free, anthers 2-celled introrse, the cells adnate nearly their whole length, rudiment of ovary none. Disk in the female urceolate. Staminodes sometimes present, ovary 3-2-(rarely 4-) celled, cells 1-ovuled. Stigmas sessile 3-2 fid, fruit carnoso-capsular of 3-2 cocci. Small trees or shrubs, glabrous, leaves alternate (or rarely opposite) bistipulate penniveined entire or dentate, flowers diæcious (rarely monœcious) fasciculate, fascicles leaf opposed (or in the opposite-leaved species axillary). *Roxb. Fl. Ind.* iii. 829. Suregada, *Roxb.* Erythrocarpus, *Bl. Bijd. p.* 604. Ceratophorus, *Sond. in Linnœa vol.* xxiii. 120.

1. Gelonium lanceolatum, *Willd.*—A small tree, branches terete, leaves alternate oblong ovate or obovate or elliptic-lanceolate entire or with a few teeth towards the apex smooth shining firm, ¾-8 inches long by ½-3 inches broad, petioles 1-3 lines long, stipules early deciduous and leaving prominent circular scars, flowers in short leaf-opposed fascicles sometimes subracemose often gummy, flowers yellow fragrant. Male, calyx 5-leaved slightly puberulous, stamens 17-60, receptacle more or less glandular, glands sometimes 3-lobed, filaments as long as the calyx, female, calyx 5-6 leaved, ovary 3-celled, stigmas flat bifid, the arms entire or crenate or much cleft or lobed. Capsule fleshy yellow smooth 3-valved 3-celled. *Roxb. Fl. Ind.* iii. 831. G. multiflorum, *Adr. Juss. Tent. Euph.* iii. *t.* 10. *fig.* 31-*A.* G. fasciculatum, *Roxb. Fl. Ind.* iii. 832. Suregada multiflora, *Baill. etud. Gen. Euph.* 396. G. multiflorum, lanceolatum, and angustifolium, *DC. Prod.* xv. 1127-8.

Not uncommon throughout our eastern mountains, generally on the banks of streams.

Analysis, Pl. XXII, fig. 6.

1. Branch of a male tree in flower.
2. A male flower bud, sepals 5 imbricate, no petals, anthers about 30 erect in the bud.
3. Male flower fully expanded, stamens only 17.
4. Anther, front view.
5. Anther, back view.
6. A fascicle of female flowers.
7. A fruit.
8. A female flower, stamens 3 each 2-cleft.
9. The same, the 5-parted imbricate calyx open to expose the ovary.
10. Ovary cut vertically.
11. Ovary cut transversely 3 cells, each 1-ovuled. (The male from dried specimens, the female copied from Wight's figure.)

EXCÆCARIA. Linn.

Gen. Char. Calyx-segments 3-2 sometimes subobsolete in the male, imbricate in both sexes, petals and disk none in either sex. Stamens 3-2 central, filaments free or shortly connate at the base or connate their whole length in a column, anthers 2-celled, cells adnate lengthways, no rudiment of ovary, ovary (4)-3-2 celled, cells 1-ovuled. Styles (4-) 3-2-simple, connate below, stigmatose on the inside, fruit a capsule furnished with a central column, sometimes fleshy at first but splitting at maturity, seed carunculate, embryo vertical, cotyledons broad. Trees or shrubs often furnished with a blinding milky juice, leaves simple generally alternate rarely opposite bistipulate, flowers monœcious or rarely diœcious in axillary or terminal spikes. *Linn. Gen. Pl.* Sapium, *Jacq.* Triadica, *Lour.* Commia, *Lour.* Stillingia, *Ad. Juss.* Falconeria, *Royle.* Bonania, *A. Rich.* Spirostachys, *Sond in Linnœa.* Sclerocroton, *Hockst.* Sapiopsis, *Mull. Arg. in Linnœa.* Sillingfleetia, *Boj. Hort. Maurit.* Gymnobothrys, *Wall.*

Sec. Falconeria.—*Male calyx bifid, female* 2-3-*fid, fruit baccate at first but bursting at maturity, seed spuriously arillate.* (Genus Falconeria, *Royle*; Gymnobothrys, *Wall.*)

1. Excæcaria insignis, *Royle.*—A good sized tree, very milky, glabrous, ramuli thick rigid, leaves elliptic acuminate or cuspidate membranaceous serrated reticulato-venose beneath, 4-8 inches long by 1½-3½ broad, petioles 1-2 inches long biglandular at the apex. Spikes unisexual densely flowered, bracts very small, female 1-flowered, male many-flowered, male flowers small, segments of the male calyx crenato-denticulate or entire, ovary 2-3 celled. Capsule 3 lines long by 2 wide ovoid, 2-3 lobed smooth. Falconeria insignis, *Royle. Illus. Bot. Himal. p.* 354. F. Wallichiana, *Royle, l. c.* F. Malabarica, *Wight Icones tab.* 1866.

Not uncommon in subalpine tracts on both sides of the Presidency; on the Kurnool hills (Nallay Mallays) called Garpa Shola; also in Ceylon, Bombay and Bengal; the milky juice is very poisonous.

Analysis.

1. Portion of a male spike.
2. Male flowers, sepals 2, stamens 2.
3. Portion of a female spike.
4, 5. Female flowers.
6. Ovary cut vertically.
7. Ovary cut transversely.

Sec. SCLEROCROTON.—*Male calyx 3-parted, segments ovate or lanceolate connate at the base or free, capsule generally dry, seed not spuriously arillate.*

** Female calyx without glands inside.*

2. EXCÆCARIA COCHINCHINENSIS, *Lour.*—A small tree or shrub, leaves opposite obovato-lanceolate acuminate at both ends crenato-serrate, 3-5 inches long by ¾-1½ broad, petioles 3-5 lines long without glands, stipules narrow lanceolate, bracts broad ovate acuminate with 2 small inflexed glands at the base, all 1-flowered. Male calyx subsessile 3-parted, the segments in both sexes dentate oblongo-ovate acuminate. Stamens 3, female flowers shortly pedicelled, styles equalling the ovary. *Lour. Fl. Cochinch vol.* ii. 750. E. crenulata, *Wight Icones. tab.* 1865. Similar to E. oppositifolia, but the spikes laxly flowered and the bracts much shorter.

Very common in our western forests up to 5000 feet elevation, also in Ceylon and Cochin China.

Analysis, Pl. XXII, fig. 5.

1. Portion of a male spike magnified.
2. The same more advanced, highly magnified.
3. Male flowers with their bracts, anthers erect in the bud.
4. A male flower, sepals 3 imbricate and stamens 3.
5. Anther back view.
6. Female flowers, calyx, ovary, and 3 styles, no staminodes.
7. Ovary cut vertically, ovules pendulous.
8. Ovary cut transversely, 3 cells, each 1-ovuled.

** * Female calyx with teeth-like glands at the base inside.*

3. EXCÆCARIA INDICA, *Willd.*—A small tree, leaves penniveined alternate membranaceous lanceolate acuminate at the apex acute at the base serrated, obscurely 2-4 glandulose on the margins at the base, rather shining above, opaque beneath, 1½-4½ inches long, by 5-10 lines broad, petioles 3-5 lines long without glands, stipules ovato-lanceolate, spikes amentiform terminal solitary about equalling the smaller leaves, bracts triangulari-ovate acute puberulous supported by 2 fleshy glands, the male many-flowered pedicelled, pedicels pilose, the female on pedicels 1-2 lines long, the calyx-segments in both sexes lacerated, the female with many teeth-like glands inside at the base. Stamens 3, ovary 3-2-celled, style long slender, 3-4-times as long as the ovary, connate below into a column. Capsule globose about 1 inch in diameter woody scarcely 3-lobed, seeds oblong 5 lines long smooth. Sapium Indicum, *Willd. Sp. Pl.* iv. 572;—*Roxb. Fl. Ind.* iii. 692;—*Wight. Icones tab.* 1950. Excæcaria Indica, *DC. Prod.* xv. 1216. Sapium Hurmais, *Hochst.* Stillingia Indica, *Baillon.*

Ceylon, warmer parts of the island, called Kirri-makulu; also in Bengal and in Africa, and in Malabar if Rheede's figure *Hort. Mal.* iv. *t.* 51 is correctly quoted; the juice of the tree is very poisonous and the seeds are used to poison fish.

Sec. EUEXCÆCARIA.—*Male calyx reduced to* 3-2-1, *subulato-acuminate often somewhat unequal, small segments. Capsule dry, seed not spuriously arillate. Similar to the preceding section, except that the calycine segments are more reduced and subulate.*

4. EXCÆCARIA OPPOSITIFOLIA, *Jack.*—A small tree, stipules broadly ovate from the base subscariose subulate acuminate 4-7 lines long, leaves opposite elliptico-lanceolate acuminate, crenato-dentate firm shining above, 4-6½ inches long by 1½-2½ inches broad, petioles about ½ an inch long without glands, male spikes 2½-3½ inches long forming cylindric aments, densely flowered from the base to the apex, bracts imbricate oblongo-ovate rigid thick calloso-mucronate with the glands small and smooth. Male calyxes subsessile bibracteolate. Segments quite free from the base narrow-ovate lacerate, female flowers and fruit not seen. *Jack. in Calc. Journ. of Nat. Hist.* iv. 386;—*DC. Prod.* xv. 1219. Stillingia, *Baillon.*

Malabar and Mysore, also on the Bombay ghats. Very like Ex. Cochinchinensis, but differing in its more densely flowered ament-like spikes and in its longer bracts; perhaps not distinct as a species.

5. EXCÆCARIA AGALLOCHA, *Linn.*—A small sea-coast tree, leaves alternate ovate or elliptic, smooth on both sides, remotely and slightly serrate or entire, with 2 glands at the base on the margin, 2-3 inches long by 1-1¾ inch broad, petioles about an inch long, smooth without glands. Stipules small subulate, spikes axillary solitary or several together, bracts 1-flowered. *Male* amentiform cylindric densely flowered 1½-3 inches long; *female* 2-3 times shorter than the male and in different axils, bracts densely imbricate broad short truncate without separate glands but glandulosely thickened. Male calyx sessile bibracteolate, the segments linear-lanceolate lacerate, female-calyx with the segments ovate acuminate and a little shorter than the pedicels furnished inside with a gland on each side at the base. Stamens 3, anthers at length much exserted, styles 3 recurved equalling the ovary shortly connate at the base. Capsule 3-lobed, seed subglobose. *L. Sp. Pl. p.* 1451;—*Roxb. Fl. Ind.* iii. 756. Commia Cochinchinensis, *Lour. Fl. Cochinch.* Stillingia, *Baillon.*

A common tree in salt backwaters throughout the presidency, and in Ceylon (called Tella-kiriya) and Bengal, &c. Also in the Philippines, Timor, Java, Cochin China, New Caledonia and Australia; the milky juice is very poisonous and blinding, and produces inflammation and ulceration; the wood is only used for fuel and charcoal.

TRIBE EUPHORBIEÆ.

EUPHORBIA. L.

Gen. Char. Flower-heads resembling single flowers. Involucre calyx-like, cup-shaped, with 4 or 5 minute teeth, alternating with as many horizontal glands, which are sometimes expanded into petal-like appendages. Within are 10 to 15 male flowers, consisting each of a single stamen with an articulated filament, and a single female flower in the centre, reduced to a stipitate 3-celled ovary protruding from the involucre, with one pendulous ovule in each cell. Style 3-cleft, the branches (or distinct styles) entire or 2-lobed. Capsule separating into three 2-valved cocci. Herbs, shrubs or trees, abounding in milky juice. Stem-leaves alternate, without stipules, the flowering-branches umbellate dichotomous, with usually opposite leaves, or all the leaves opposite and often stipulate ; or succulent leafless shrubs.

The species of this genera scarcely deserve a place in this work. Species 1 to 6 are Cactus-like thorny shrubs or small trees with fleshy branches, and are in use as hedge plants ; No. 7 is the common species so well known as the milk-hedge, with pipe-like fleshy unarmed branches.

1. EUPHORBIA NERIIFOLIA, *Linn.*—A small tree, branches obsoletely 5-angled, prickles stipularly twin short diverging black, leaves subsessile obovato-oblong obtuse mucronulate, about 3-6 (or even 12) inches long, cymes sessile or subsessile in the upper axils, 1-3-headed rarely dichotomously several headed, the leaflets under the involucre ovate membranaceous, involucre hemispherical, lobes large ovate fimbriated at the margin, glands transversely ovate. Styles united up to the middle, capitate and entire at the apex, capsule sharply trigonal. *L. Hort. Cliff. p.* 196 ;—*DC. Prod.* xv. 79. E. ligularia, *Roxb. Fl. Ind.* ii. 465.

A small tree, 20 feet high, with a trunk up to 3 feet in girth, abounding with a milky acrid juice ; the plant is sacred to the goddess of serpents.

2. EUPHORBIA NIVULIA, *Ham.*—A small tree or large shrub, branches round somewhat verticellate, prickles stipulary short divaricate, leaves near the apex of the branches tongue-shaped mucronate fleshy, 4-6 inches long by 1½-2 broad near the apex, whence they taper towards the base smooth shining glabrous. Cymes axillary short peduncled 3-headed, involucre hemispherical, the lobes broad truncate denticulate, styles united to the middle scarcely thickened at the apex. *Ham. Linn. Trans.* xiv. 286 ;—*Wight Icones tab.* 1862. E. neriifolia, *Roxb. Fl. Ind.* ii. 467.

Common on arid rocky hills about Coimbatore, Madura and other parts of the presidency, east and west sides.

3. EUPHORBIA ANTIQUORUM, *Linn.*—A shrub or small tree, erect ramous, leaves (rarely present) obovato-spathulate, branches 3-4-or more-angled, furnished with numerous protuberances each armed with 2 short spreading stipulary thorns ; joints straight, peduncles solitary or in pairs 3-1-headed a little above the axils of the stipules, the floral leaves ovate shorter than the involucre lacerated, involucre hemispherical, the lobes connivent ovate fimbriate. Capsule deeply trisulcate. *Linn. Hort. Cliff. p.* 196 ;—*Wight Icones tab.* 897.

Common throughout India and in Ceylon, called in Ceylon Dalook.

Analysis, Pl. XXII, fig. 4.

1. A cyme with 3 heads of flowers.
2. A head of flowers (resembling a single flower.)
3. A head of flowers cut through vertically, one female flower (nothing but a stipitate 3-celled ovary) in the centre and several male flowers (nothing but single stamens each with an articulated filament) round it.

4, 5, 6. Male flowers with the petal-like glands.

7. Capsule cut transversely 3-celled, cells 1-ovuled. (Copied from Wight's *Icones.*)

4. EUPHORBIA TORTILIS, *Rottler.*—A small tree or large shrub, stems erect ramous jointed ; joints spirally twisted angular, angles furnished with armed protuberances, cymes fascicled in the sinuses between the angles, each shortly pedunculate and 3-headed. *Wight Icones tab.* 898.

Common in this presidency and in Ceylon ; differs from the last in its twisted joints ; called in Ceylon Seenook.

5. EUPHORBIA TRIGONA, *Roxb.*—A small tree or shrub, erect 3-sided with prominent repand angles, stipulary spines 2 or sometimes 4, leaves deciduous obovate cuneate, cymes above the axils 3-headed, the middle one nearly sessile sterile, the lateral ones fertile pedicelled. *Roxb. Fl. Ind.* ii. 468 ;—*Wight Icones* 898.

Coimbatore, on low arid hills.

6. EUPHORBIA CATTIMANDOO, *Elliott.*—Shrub or small tree, erect 5-sided with prominent repand angles ; stipulary thorns paired short subulate, leaves sessile succulent deciduous obovate subcuneate cuspidate glabrous ; cymes crowded 3-headed, the middle one usually sterile and the lateral ones fertile, sometimes the reverse. *Wight Icones tab.* 1993.

Vizagapatam district, very common, flowering from March till May ; called in Teligu Cattimandoo. This plant yields a substance something like gutta-percha ; the milk is boiled and sold in cakes or cylinders, and when heated again can be used as a cement and as an outward application in cases of rheumatism.

The above 6 species belong to DeCandolle's Section Diacanthium and are all armed with twin spines, and I have a 7th species of this section, a small tree on the Anamallays 3-4000 feet elevation, with very compressed stems, but it is not perfect enough for description ; the next species belongs to the Section Tirucalli and is unarmed.

7. EUPHORBIA TIRUCALLI, *Linn.*—An erect unarmed succulent small tree, branches cylindrical scattered or clustered very divergent, of a bright shining green, leaves very few and small linear oblong or wanting, flower-heads clustered on very short pedicels in the forks of some of the smaller branches, glands of the involucre peltate, capsule hairy size of a large pea. Styles 2-lobed. *Roxb. Fl. Ind.* ii. 470.

A common hedge plant all over India and in the Archipelago, called Tirucalli in Tamil and Lanka Sij in Bengal ; well known by the name of milk-hedge ; full grown trees 3 feet in girth ; the wood is white, close grained, and rather hard.

GENERA ALLIED TO EUPHORBIACEÆ.

DAPHNIPHYLLUM. BLUME.

For Gen. Char. see letter-press to Pl. cclxxxviii.

This genus is generally referred to Euphorbiaceæ, or as allied to that order. DeCandolle makes a separate order for it, *i. e.*, *Daphniphyllaceæ*, which he places between Euphorbiaceæ and Buxaceæ, (which two orders are now generally amalgamated,) and he considers it well separated from them by its small embryo in the apex of the albumen.

1. DAPHNIPHYLLUM GLAUCESCENS, *Bl. Bijdr. p.* 1153.—For description, &c. see Pl. cclxxxviii. (under the name of D. Roxburghii, *Baillon*, which should be altered as above, as Blume's is the older name.)

SARCOCOCCA. LINDLEY.

Gen. Char. Calyx imbricate in both sexes, 4-parted in the male 4-6 parted in the female, petals and disk none. Stamens as many as the calyx segments and opposite to them, inserted round the small rudiment of an ovary, filaments free stout, anthers fixed a little above the base, the cells adnate in their whole length to the connective which is slightly produced and apiculate, rudiment of ovary 4-lobed. Ovary 2-3 celled, cells 2-ovuled, styles as many as the cells entire or bilobed, fruit subbaccate not opening, seed albuminous arillate, cotyledons broad ovate fleshy compressed, radicle superior shorter than the cotyledons. Evergreen shrubs, branches terete, leaves simple alternate exstipulate 3-nerved or penniveined entire, inflorescence axillary racemiform many-flowered, the female flowers below the male. *Lindley in Bot. Reg. t.* 1012 ;—*DC. Prod.* xvi. 2. (under Buxaceæ). Lepidopelma, *Klotzsch.*

1. SARCOCOCCA SALIGNA, *Don.*—A large shrub, leaves very glabrous and shining lanceolate to nearly orbicular 3-nerved cuspidately acuminate, membranaceous to subcoriaceous, generally 3-4½ inches long by 1½ broad but very variable in size, inflorescence generally very much shorter than the leaves, male peduncles 2-4-bracteolate or without bracteoles, styles more or less recurved. Buxus saligna, *Don. Prod. Fl. Nep. p.* 63 (1825). Sarcococca pruniformis, *Lindl. Bot. Reg.* xii. 1012. S. trinervia, *Wight Icones* 1877. Buxus coriaceus, *Spreng.* S. salicifolia, *Baillon.* S. saligna and Zeylanica, *DC. Prod.* xvi. *p.* 11 and 12.

Very common at the higher elevations on our western mountains (Ootacamund, &c.) but I have also found it in the plains, South Canara and Malabar ; the wood is something like Box-wood, but it is very small.

Analysis, Pl. XXIV, fig. 5.

1. Portion of a branch in flower, male flowers above numerous, female below.
2. A male flower, sepals 4 decussately opposite and imbricate.
3. A male flower open, shewing the 4 stamens (opposite the calycine segments) inserted round the 4-lobed rudiment of an ovary, no petals or disk.
4. Anther, back view.
5. Anther, front view.
6. The 4-lobed abortive ovary.
7. A female flower and bract.
8. A single bract.
9. Vertical section of the ovary, ovules pendulous.
10. Transverse section, cells 2-ovuled. (All drawn from living specimens.)

11 to 15. Fruit, seed and embryo, copied from Wight's *Icones.*

ORDER LXX.—URTICEÆ.

Flowers unisexual or rarely polygamous, usually in cymes or heads, not in catkins. Perianth calyx-like, of 1 to 5 divisions. Stamens as many as perianth-segments, and opposite to them, rarely reduced to fewer or one. Anthers 2-celled. Ovary free or rarely adherent, 1-celled, with 1 ovule, rarely 2-celled, with 2 ovules, of which 1 only comes to perfection. Style usually short or none with 1 or 2 long or short stigmas. Fruit a 1-seeded indehiscent drupe, or winged samara, or small seed-like nut. Albumen fleshy or none. Radicle superior. Trees, shrubs, herbs, or climbers, furnished with stipules. Foliage and inflorescence very various. A scabrous surface and a milky juice or acrid or stinging secretions are very common.

This order, which now includes the Celtideæ, Ulmaceæ (Elmworts), and the Artocarpeæ and Moraceæ of old authors, is a very large one, and of considerable importance to the forester. The Celtideæ are all trees and 3 of the 4 genera yield valuable timber, and they are found all

over the presidency except Gironniera, which is confined to the western forests and Ceylon. In Artocarpeæ, Artocarpus, Antiaris, Allœanthus, Ficus, and Streblus, yield large trees, and Artocarpus affords splendid timber, especially for furniture and ship-building. Ficus abounds in species, but they all yield only very inferior timbers. Allœanthus is, I believe, confined to Ceylon, and Antiaris (the largest tree in S. India) and Cudranus, to our western forests and Ceylon; but the others are found throughout the presidency. Cudranus, Plecospermum and Taxotrophis are straggling or scandent shrubs only. The Euticeæ only give small weak trees or shrubs.

Styles or stigmas 2 equal. Trees, flowers cymose polygamous or dioecious, filaments nearly erect in the bud. Celtideæ.
- Flowers polygamous, the fertile ones hermathrodite.
  - Fruit winged all round ... ... ULMUS.
  - Fruit not winged.
    - Velvetty or hirsute trees, stamens exserted, stigma short plumose ... SPONIA.
    - Glabrous-leaved trees, stamens included, stigma linear ... ... CELTIS.
    - Glabrous-leaved trees, stigmas long subulate .. .. GIRONNIERA.

Style generally simple rarely 2-lobed. The flowers of one or both sexes. closely packed on a globose or cylindric generally succulent receptacle (except in Taxotrophis.) Artocarpeæ.
- Unarmed.
  - Monœcious, male and female flowers on different globular or cylindric fleshy receptacles ... ... ARTOCARPUS.
  - Monœcious, male flowers outside a flat fleshy receptacle, female flowers solitary axillary ... ... ANTIARIS.
  - Monœcious, male and female flowers together inside a glabrous or pear-shaped fleshy receptacle... .. .. FICUS.
  - Dioecious, male flowers densely packed on a cylindric unilateral receptacle, female on a globular receptacle .. .. .. ALLÆANTHUS.
  - Dioecious or monœcious, male flowers capitate but rather lax on a globular receptacle, female solitary or subsolitary in the axils ... STREBLUS.
- Armed.
  - Dioecious, male and female flowers in dense globular fleshy heads ... CUDRANUS.
  - Dioecious, male flowers in globular heads, female immersed in a succulent ovoid receptacle ... ... PLECOSPERMUM.
  - Dioecious, male flowers in small heads or spicate, female flowers solitary or racemose .. .. TAXOTROPHIS.

Style or stigma simple, flowers distinct in cymes, clusters, heads or spikes. Euurticeæ.
- Stigma filiform.
  - Female perianth enclosing the ovary... ... ... BOHMERIA.
  - Female perianth not enclosing the ovary ... ... LAPORTEA.
- Stigma short.
  - Leaves snowy-white beneath, fruit baccate ... ... MOROCARPUS.
  - Leaves not white beneath, fruit dry ... ... OREOCNIDE.

ULMUS. LINN.

For Gen. Char. see letter-press to Pl. cccx.

1. ULMUS INTEGRIFOLIA, *Roxb.*—For description, &c, see Pl. cccx.

CELTIS. TOURN.

For Gen. Char. see letter-press to Pl. cccxii.

1. CELTIS ROXBURGHII, *Planch.*—For description, &c. see Pl. cccxii.

Under the name of C. trinervia, *Roxb.*, which should be altered as above, Roxburgh's name being a synonym, as that specific name is occupied by another species.

2. CELTIS SEROTINA, *Planchon.*—A very large handsome tree, young parts aureo strigose, leaves obliquely ovate with a along fine acumination, serrated from the apex to below the middle 3-nerved, glabrous in age, 1½-3 inches long by ¾-1¼ broad, petioles 3-5 lines long, inflorescence axillary or from the old axils; fructiferous pedicels usually 3 together, one free the other 2 united at the base, berry nearly oval glabrous. *Planch. Ann. Sc. Nat.* 3. *Ser.* x. 262;—*Wight. Ic.* 1970.

This handsome tree is very common in the Wynaad at 2500 feet elevation, and abundant on the Nilgiris at 5000-6000 feet, where it is well known as the Nilgiri elm, flowering in February and March with the young leaves.

For Analysis, see Pl. cccxii.

3. CELTIS WIGHTII, *Planchon.*—A small tree, young parts strigose, leaves oblongo-ovate to lanceolate very hard and coriaceous, 3-nerved glabrous on both sides, entire, 2-5 inches long by 1-2½ broad, petioles 3-9 lines long, stipules somewhat peltate. Cymes polygamous (male and hermathrodite) as long or twice as long as the petioles, fruit ovate smooth shortly rostrate. *Planchon l. c.* 307;—*Wight Icones. tab.* 1969.

Common in subalpine tracts on both sides of the presidency and in Ceylon, called in the Circars Tellá káká mushti; wood exceedingly hard.

4. Celtis dysodoxylon, *Thw.*—A middling sized tree, the young parts ferrugineo-pilose, leaves entire or rarely obscurely sinuato-dentate ovate more or less abruptly acuminate firm 3-nerved, a little oblique and narrowed at the base, glabrous above and intensely green, paler beneath and the costa and veins puberulous, 2½-3½ inches long by 1¼-2 inches broad, petiole 1½-3 lines long, cymes short few-flowered ferrugineo-pilose, flowers 5-merous densely pilose at the base inside, ovary ferrugineo-strigose towards the apex. Stigmas elongate acute, drupe small subspherical a little acuminate. *Thw. En. Pl. Zey. p.* 267.

Ceylon, central provinces up to 5000 feet elevation, called Gooranda; the freshly cut wood has a strong and disgusting odour.

SPONIA. Comm.

For Gen. Char. see letter-press to Pl. cccxi.

1. Sponia Wightii, *Planch.*—For description, &c. see Pl. cccxi.

2. Sponia velutina, *Planch.*—A middling sized tree, branchlets and leaves softly velvetty, the clothing on the very young parts shining, leaves ovate oblong cuspidately acuminate slightly unequal at the base, cordate or rounded serrated on the margin above beset with rough points, about 4 inches long by 1½ broad, petioles 3-4 lines long, cymes (male female and polygamous) short peduncled or subsessile equalling or twice as long as the petioles, many flowered. Male flowers hairy outside, berries ovate glabrous or sometimes with a few hairs. *Planchon. Ann. des Sci. Nat. 3rd Ser.* x. 264;—*Wight Icones*, 1990.

Widely distributed throughout India. This is closely allied to No. 1, but that is generally (as far as I have observed always) diœcious, and in this male and female and polygamous flowers are mixed in the same axil.

3. Sponia Orientalis, *Planch.*—The Ceylon Sponia is kept distinct from our Indian species by Planchon under this name, but I do not know how it differs from No. 1 except in having rather longer male cymes.

GIRONNIERA. Gaudich.

For Gen. Char. see letter-press to Pl. cccxiii.

1. Gironniera reticulata, *Thw.*—For description, &c. see Pl. cccxiii.

2. Gironniera subæqualis, *Planch.*—A good sized tree, 40 feet, young parts, petioles and veins on the underside of the leaf adpressedly pilose, leaves a little rough oblong or elliptic or oblongo-elliptic acuminate a little unequal at the base, crenated towards the apex or subentire, 2½-6½ inches long by 1-3 inches broad, petioles 2-4 lines long, female flowers axillary solitary or several together separately or on a short raceme. *Planchon. Ann. des Sci. Nat. Ser.* iii. *vol.* x. *p.* 339. Helminthospermum scabridum, *Thw. in Hook. Journ. of Bot.* vi. 302. *t.* 9. *c.*

Ceylon, central provinces, up to 4000 feet elevation.

For Analysis, see Pl. cccxiii.

ARTOCARPUS. Linn.

For Gen. Char. see letter-press to Pl. cccviii.

1. Artocarpus hirsuta, *Lam.*—For description, &c. see Pl. cccviii.

2. Artocarpus nobilis, *Thw.*—For description, &c. see Pl. cccix.

3. Artocarpus integrifolia, *Willd.*—A large timber tree, young branches hirsute, leaves alternate oval to ovate-oblong lobate in saplings, coriaceous glabrous and shining above, a little hirsute beneath, 4-12 inches long (or much larger in saplings), petioles 4-12 lines long, stipules twin broad-lanceolate nearly glabrous sheathing soon deciduous. *Male* ament short peduncled as large or a little larger than a man's thumb, cylindric mixed with the female on the boughs or trunk or even from the root, densely covered with small sessile flowers: calyx or perianth 2-leaved, segments wedge-formed equal a little hairy, filament thick club-shaped a little longer than the calyx. *Female* ament oblong densely covered with small sessile ovaries perforated at the apex for the style, ovaries 4-6 angled at the apex and solid throughout except at the base where the cell is lodged. Style much protruded, stigma recurved grooved on the outside, fruit oblong murexed up to about 3 feet long by 1 foot wide, and weighing 10 to 60 lbs. Seed reniform as long as a nutmeg. *Willd.*;—*Roxb. Fl. Ind.* iii. 522;—*Wight Icones tab.* 678.

Found throughout our western mountain forests up to 4000 feet elevation, and also much cultivated throughout India and Ceylon. Called in English the jack tree (a corruption of the Sanscrit name), in Tamil Pilla, and in Teligu Panasa; the timber is excellent and much in use for furniture and house building; it is at first yellow fading to brown, hard and brittle, resembling Satin and apt to warp if not properly seasoned; a cubic foot unseasoned weighs 50 lbs. and 44 when seasoned, and its specific gravity is ·706. The fruit is a favorite article of food with the natives, and the seeds are roasted and eaten; the tenacious white juice makes a good bird-lime.

4. Artocarqus Lakoocha, *Roxb.*—A very large tree, young shoots downy, leaves alternate about the apex of the branches oblongo-ovate, oval, ovate or even somewhat cordate acute or with a longish fine acumination, margin entire, glabrous above beneath

densely downy and whitish, primary veins much raised and prominent beneath and veinlets beautifully reticulated, 6-12 inches long by 2-6 inches broad, petioles ½-1 inch long. Stipules small caducous, aments axillary the male generally in the lower axils, the female in the upper. *Male* aments subsessile irregularly roundish, size of a nutmeg. Calyx 3-4 leaved. *Female* short peduncled globular, fruit minutely velvetty about as large as a man's fist, generally of an irregular roundish form, yellow when ripe, seeds oblong. *Roxb. Fl. Ind.* iii. 524 ;—*Wight. Icones* 681.

Common in South Canara, Coorg and Malabar, from the plains up to 3000 feet, also on the Bombay ghats, and in Ceylon ; called Woti huli in South Canara.

var. β.—leaves glabrous on both sides, elliptic acute and unequal sided at the base. Ceylon, south and central parts of the island. Artocarpus Gomiziana, *Wall Trecul. Ann. Sc. Nat. 3rd Ser.* vii. 118. I only have this glabrous variety from Ceylon.

5. Artocarpus incisa, the Bread-fruit tree, is common in a cultivated state on the western side of this presidency and in Ceylon, but it is not indigenous.

CUDRANUS. Rumphius.

Gen. Char. Flowers diœcious, both sexes densely crowded in globular peduncled axillary heads, bracteoles numerous, 2-3-4, incurved at the apex and alternate with the calycine segments, male calyx 4-parted or 4 sepals, the sepals spathulato-oblong concave imbricate in 2 series in the bud. Stamens 4, filaments ⅔rds the length of the sepals and opposite to them and often cohering with them at the very base, anthers oblong 2-celled, cells opposite dehiscing longitudinally, rudiment of pistil subulate acute. *Female* calyx 3-4 sepaled, sepals imbricate spathulato-oblong concave obtuse, ovary free 1-celled 1-ovuled. Style simple, stigma filiform, ovule pendulous from the apex of the cell campylotropal. Achenia 1-seeded included with the fleshy calyxes in the globose receptacle : seed inverse, testa crustaceous, embryo in the axil of fleshy albumen, cotyledons unequal foliaceous the margin convolute and somewhat folded round the radicle, radicle long curved ascending. Scandent thorny shrubs, leaves alternate petioled entire penniveined, stipules twin axillary, peduncles simple axillary solitary or twin. *Rumphius Amboin.* v. *p.* 22, *tt.* 15, 16. Cudranus and Maclura (Sec. Plecospermum), *Miquel.* Cudrania, *Trecul. Ann. Sc. Nat.* 3. *Ser.* viii. 122. Maclura (Sec. Leptosura), *Blume. Mus. Bot.* ii. 83. Trophis, *Willd. in part.*

1. Cudranus Rumphii, *Thw.*—A scandent shrub, young ramuli pubescent or glabrous, spines axillary recurved 3-4 lines long, leaves glabrous elliptic or ovate or obovate acute or acuminate and mucronate rarely obtuse entire, 1½-4 inches long by 1-1⅓ broad, petioles 2-6 lines long. *Thw. En. Pl. Zey. p.* 262. C. Birmanus, Javanus, Javanensis, and Amboinensis, *Rumph. l. c.* C. Amboinensis, *Miq. Fl. Ind. Bat.* i. 290. Cudrania Javanensis, *Trec. l. c.* (not *Wight Icones* 1961). Maclura Javanica, *Miq. l. c.* 280. Maclura Javanica, Timorensis and Amboinensis, *Bl. Mus. Bot.* 83, 84. *tab* 31. Plecospermum cuneifolium, *Thw. in Hook. Journ. Bot.* vi. 303. Trophis spinosa, *Willd. Sp. Pl.* iv. 734, *in part* (not *Roxb.*)

Ceylon, hot dry parts of the island.

Analysis, Pl. XXVII, fig. 1.

1. Portion of a branch of male plant in flower.
2. A head of male flowers, vertical section.
3. A male flower bud.
4. A male flower open.
5. A sepal and stamens.
6, 7. Anthers, front and back view.
8. Portion of female plant in flower.
9. A head of female flowers.
10. The same, vertical section.
11. 3-sepaled female flower.
12. A 4-sepaled female flower.
13. Ovary cut vertically, shewing the solitary pendulous ovules. (Partly from Blume's drawing, partly from dried Ceylon specimens)

PLECOSPERMUM. Trecul.

Gen. Char. Flowers diœcious, both sexes densely aggregated in globose heads. *Male* calyx turbinate 4-fid, segments imbricate, stamens 4 opposite the calyx segments inflexed in the bud, anthers 2-celled dehiscing longitudinally and introrse, filaments flat at the base attenuated at the apex, rudiment of pistil small filiform. *Female* flowers sunk in a fleshy ovoid receptacle, calyxes connate and indistinct 4-toothed at the apex. Style terminal simple filiform, papillose towards the apex much exserted, ovary oblong 1-celled 1-ovuled, ovule pendulous, the receptacle in fruit bacciform, all the ovaries except 1 or 2 obliterated, seed pendulous, testa membranaceous, embryo exalbuminous amphitropal, cotyledons thick unequal folded, radicle small superior. *Trecul. Ann. Sc. Nat. 3rd Ser.* viii. 124. *t.* 4. *fig.* 121, 126 ;—*Batis in part Roxb.*

1. Plecospermum spinosum, *Roxb.*—A small straggling tree or subscandent shrub, diœcious, branches long drooping or scandent, every axil with a long sharp somewhat recurved spine, leaves alternate rather remote obovato-oblong or oval obtuse glabrous shining entire, 2-3 inches long by 1½ inches broad, petioles 4-8 lines long. *Male* aments peduncled axillary or scattered, calyx 4-parted, segments somewhat emarginate or 2-lobed. Stamens 4 inserted round the subulate rudiment of a pistil. *Female* flowers axillary on a fleshy ovoid pedicelled receptacle, calyx indistinct 4-toothed at the apex, ovaries about 10-12 immersed in the pulp of the receptacle. Style single crooked long pubescent, berry generally only 1 comes to maturity globular the size of a pea, as it ripens the receptacle is obliterated and becomes as a single 1-seeded berry. *Trecul Ann. des Sci. Nat.* iii. *vol.* viii. *p.* 124 ;—*Wight Icones tab.* 1963. Batis spinosa, *Roxb. Fl. Ind.* iii. 763.

A common plant throughout India and Ceylon, often used for hedges.

Analysis, Pl. XXVI, fig. 2.

1. Portion of a branch of male tree in flower.
2, 3. Male flowers, shewing 4 stamens and abortive ovary.
4. Male flower open.
5, 6. Anthers, front and back view.
7. Portion of a branch of female tree in flower.
8. Female inflorescence.
9. Vertical section of the same.
10. Vertical section of fruit.
11. Transverse section of fruit. (All copied from Wight's *Icones.*)

ALLÆANTHUS. Thw.

For Gen. Char. see letter-press to Pl. cccv.

1. Allæanthus Zeylanicus, *Thw.*—For description, &c. see Pl. cccv.

ANTIARIS. Lesch.

For Gen. Char. see letter-press to Pl. cccvii.

1. Antiaris innoxia, *Blume.*—For description, &c. see Pl. cccvii.

STREBLUS. Lour.

Gen. Char. Flowers diœcious or monœcious, male capitate or spicate, female solitary or spicate. *Male* calyx 4-parted, segments sub-valvate, stamens 4 opposite the calycine-segments inserted round the rudiment of a pistil, incurved in æstivation shooting out with elasticity, female sepals 4 imbricate in 2 series. Ovary 1-ovuled, ovules pendulous from the side close to the apex, style a little excentric 2-parted, arms subulate sometimes equal stigmatose, embryo exalbuminous, cotyledons fleshy often connate. Trees or shrubs unarmed, leaves serrulate. *Lour. Fl. Cochinch.* ii. *p.* 615 ;—*Miq. Fl. Ind. Bat.* i. 277. Epicarpurus, *Bl.* Trophis, *Retz* ;—*Roxb.*

1. Streblus aspera, *Lour.*—A small or middling sized tree, leaves alternate obovate to lanceolate often spathulate at the base, cuspidato-acuminate serrated towards the apex or along the whole margin, very rough above, 1½-6 inches long, 1-2½ inches broad, petioles 1-3 lines long. Male flowers capitate, heads axillary aggregated short peduncled, females axillary 1-2 together longish peduncled ; fruit drupaceous 1-seeded, testa crustaceous, cotyledons very unequal-sided. *Lour. l. c.* Epicarpurus orientalis, *Wight Icones tab.* 1961. Trophis aspera, *Roxb. Fl. Ind.* iii. 761.

A very common tree throughout India and Ceylon up to no great elevation, called Barinke in Teligu ; the leaves are used to polish ivory, and cart wheels are sometimes made from the wood ; in Ceylon it is called Gatta-nittool.

Analysis, Pl. XXVI, fig. 1.

1. Portion of a branch of the male tree.
2. A male flower bud.
3, 4. Male flowers shewing 4 stamens and the abortive ovary.
5. Anther, front view.
6. Anther, back view.
7. Portion of a branch of female tree.
8. A female flower.
9. The same, more advanced.
10. Ovary more advanced.
11. Vertical section of ovary,
12. Transverse section of ovary. (All drawn from dried specimens.)
13, 14, 15. Analysis of the seed copied from Blume's drawing.

TAXOTROPHIS. Blume.

Gen. Char. Flowers diœcious, the male spicate or capitate, the female solitary loosely racemose few flowered. *Male* : the calyx 4-parted. Stamens 4 opposite, the sepals inserted round the rudiment of a pistil incurved in the bud ; anthers basifixed introrse. *Female* : sepals 4 subbiseriate slightly imbricate, ovary 1-ovuled resting in an obliquely cup or helmet-like receptacle the upper part of which has a perforation for the style, the ovule inserted at the side near the apex, style bifid the arms generally unequal, stigmatose on the inside, embryo inverse exalbuminous, cotyledons thick very unequal or foliaceous and subequal, radicle very short or elongated obtuse superior. Armed shrubs or trees, leaves alternate stipulate entire or serrate, flowers axillary. *Blume. Mus. Bot.* ii. 77. Epicarpurus, *Wight Icones* 1962. Trophis, *Roxb. in part.*

1. Taxotrophis Roxburghii, *Blume.*—A crooked tree, branches very irregular, thorns very strong straight sharp scattered over every part, often leaf and flower bearing, leaves rhombeo-ovate or obovate to oblongo-lanceolate acuminate with the upper half or only the apex very coarsely serrate undulate glabrous glandularly-punctate, 2½ inches long by 1 broad, petioles 2-3 lines long, sti-

pules acute. *Male* flower heads axillary globular with an imbricate involucre ; *female* peduncles axillary single short 1-flowered erect. Calyx-segments cordate at the base thence tapering to a long narrow point waved large persistent and increasing with the fruit, berry obliquely oval size of a cherry half immersed in the increased receptacle pulpy. *Bl. l. c.* 279. Trophis spinosa, *Roxb. Fl. Ind.* iii. 762. Epicarpurus spinosus, *Wight Icones* 1962.

Found on both sides of the presidency and in Ceylon, also in Timor.

Analysis, Pl. XXVI, fig. 3.

1. Portion of a branch of the female tree in flower.
2. A female flower.
3. Ovary.
4. Ovary cut vertically.
5. Ovary cut transversely.
6. Portion of a branch of the male tree in flower.
7. Male flower shewing the 4 stamens and abortive style.
8, 9. Anthers, front and back view. (Nos. 1 to 5 from dried specimens; 6 to 9 copied from Wight's drawing.)

2. Taxotrophis Zeylanica, *Thw.*—A large branched shrub 8-10 feet high, sparingly thorny, ramuli puberulous, leaves glabrous membranaceous lanceolate or trapezoideo-lanceolate, obtusely acuminate mucronulate serrate to near the base minutely glanduloso punctulate, inflorescence racemose. *Male* short oblong dense-flowered ; *female* few flowered, fruiting pedicels elongated and thickened at the apex, sepals small at length inflexed and not increasing in fruit, cotyledons subequal foliaceous plicato-convolute, radicle longish. *Thw. En. Pl. Zey. p.* 264. Epicarpurus, *Thw. Hook. Journ. of Bot.* iv. *p.* 1. & *vol.* iii. *t.* 11.

Analysis, Pl. XXVI, fig. 3.

10. Portion of a branch of the female in flower.
11. Vertical section of female flower and ovary.
12. Portion of a branch of the male in flower.
13. Male flower bud.
14. Male flower open, 4 stamens and abortive ovary.
15, 16. Anthers, front and back view. (All drawn from dried specimens.)

FICUS. Linn.

For Gen. Char. see letter-press to Pl. cccxiv.

Sec. Urostigma—*Stigma elongate villous.*

1. Ficus religiosa, *Linn.*—For description, &c. see Pl. cccxiv.

Ficus Arnottiana, *Miq.*, is not, I think, distinct as a species, sessile and peduncled fruit occurring on the same trees sometimes, and I have not distinguished F. Courtallense, *Miq* , or F. Lambertiana, *Miq.*

2. Ficus infectoria, *Willd.*—A large and beautiful tree with a spreading very dense head, sometimes dropping large roots from the trunk and branches, bark pretty smooth tough and peeling off in long slips ; leaves submembranaceous alternate ovato-oblong acute waved smooth, 5-7 inches long by 2-4 broad, petioles 1-1½ inches long. Stipules about 2 inches long slender grooved, with a colored gland round their apices, fruit paired axillary sessile or subsessile the size of a pea, roundish pretty smooth white when ripe. *Willd.* ;—*Roxb. Fl. Ind.* iii. 551 ;—*Wight. Ic.* 665. Urostigma ægeirophyllum, *Miq. Fl. Ind. Bat. vol.* 1. *Pars. altera, p.* 333. U. infectoria, Tjakela et Ceylonense, *Miq. l. c.*

Malabar, &c. and Ceylon, up to 2000 feet elevation, also in Bengal. In Ceylon the bark is sometimes used instead of the Areca nut to chew with betel.

3. Ficus Wightiana, *Wall.*—A large tree, quite glabrous, leaves oblong, shortly acuminate, about 4 inches long and 1½ to 2 inches broad, rather stiff ; the primary veins arcuate and confluent at some distance from the edge, 3-nerved at the base, on petioles from 1¼ to 2 inches long. Figs nearly globular, about 4 lines diameter, on peduncles of about 1 line, solitary or in clusters of 2 to 4 on the old wood below the leaves, with very small bracts under the fig. Urostigma Wightianum, *Miq. in Lond. Journ. Bot.* vi. 566 ;—*Benth. Fl. Hong Kong. p.* 327. U. perseæfolium, *Miq. l. c.*

A variable species and closely allied to infectoria, but with larger fruit and generally smaller leaves. It is found throughout India, and in Ceylon and in Hong Kong.

4. Ficus Bengalensis, *Linn.*—An immense tree of great beauty, branches dropping roots which eventually become large trunks, leaves alternate about the extremities of the branches ovato-cordate 3-nerved entire often slightly undulate, when young downy on both sides, above glabrous or subglabrous in age, 5-6 inches long by 3-4 inches broad, just above the petiole on the under side is a broad smooth gland, petioles a little compressed 1-2 inches long downy. Stipules sheathing caducous leaving annular scars, fruit paired axillary sessile, when ripe red or yellow the size of a cherry. *Linn. Amæn.* Ficus Indica, *L.* Urostigma Bengalense, *Gaspar.*

This is the well known Banian tree, common throughout India, and much planted in avenues, topes, parks, &c. It is called Bar in Hindostani, Màree in Teligu, Ala in Tamil, and Màhà noogà in Ceylon. The wood is light coarse grained and brittle, of a light

brown color, not strong nor durable but possessing the valuable quality of being durable in water, it is used for making well rings; unseasoned it weighs 43-45 lbs, and when seasoned 36 lbs. the cubic foot, and its specific gravity is ·576. The wood of the drop is stronger and tougher, and is used for yokes of bullock carts and other purposes. Birdlime is prepared from the tenacious milky juice; the leaves are sown together and used as plates to eat off.

5. Ficus tomentosa, *Roxb.*—A very large tree, and (like the last) giving out roots from its branches, but they do not grow large, young shoots woolly, leaves alternate oblongo-cordate slightly 3-nerved a little pointed entire, pretty smooth above, very downy beneath, 4-6 inches long, on the under side of the base of the costa there is a large smooth green gland (as in the last), petioles 1 inch long channelled woolly, fruit axillary paired sessile woolly the size of a large pea, when ripe gray, bracts three large spreading woolly. *Roxb. Fl. Ind.* iii. 550. Urostigma tomentosum, *Miq. l. c.* F. mollis, *Vahl.* F. pubesceus, *Roth.*

Common in subalpine tracts throughout the Presidency and in Ceylon; the wood is soft and light and of little use even as fuel.

6. Ficus Mysorensis, *Roth.*—A large tree, ramuli petioles young leaves stipules and figs densely ferrugineo-tomentose, leaves ovate or ovato-elliptic shortly and abruptly acuminate equal-sided entire, thickly and rigidly coriaceous, in age glabrous or subglabrous above, primary veins 12-15 on each side spreading looped within the margin and often bifid towards the apex, figs axillary twin sessile oblong the young ones included in a thick calyptriform involucre, bracts 3 coriaceous sericeo-hirsute on the back. *Roth. Nov. Pl. Sp.* 390. Katon alon, *Rheede. Hort. Mal.* iii. 57. F. Gonia, *Ham. Prod.* 137. F. cotonecefolia, *Vahl.* F. citrifolia, *Willd. Sp. Pl.* iv. 1137. U. dasycarpum, *Miq.*?

Malabar, &c., Mysore and Ceylon, called in the latter island Boonooga.

7. Ficus laccifera, *Roxb.*—A very large tree, young shoots smooth, leaves alternate cordate to oval obtuse or subacute entire 3-nerved at the base firm and polished, 4-7 inches long 2·5 inches broad, petioles 1-2 inches long flattened smooth. Stipules interfoliaceous smooth finely pointed; figs axillary in pairs sessile oval smooth as large as a gooseberry, involucre 3-lobed. *Roxb. Fl. Ind.* iii. 545;—*Wight Icones* 656. Urostigma, *Miq. l. c.*

Malabar, &c., and Ceylon, called in the latter island Noogà, also in Bengal.

8. Ficus tsiela, *Linn.*—An immense tree, bark smooth greenish, no roots from the trunk or branches, leaves alternate, somewhat 3-nerved ovato-oblong pointed entire firm smooth on both sides, shining particularly above, primary veins numerous simple parallel, 4-6 inches long by 1-2 inches broad, petioles a little compressed 1-2 inches long; stipules leaving no durable scars, fruit paired axillary sessile round turbinate smooth as large as a cherry when ripe purple, involucre of 3 leaves. *Roxb. Fl. Ind.* iii. 549. F. amplissima, *Linn.* Urostigma pseudo-tjiela, *Miq.*

An immense tree, common in subalpine tracts throughout the Presidency and in Ceylon. Much planted as an avenue tree; called Juvi in Teligu.

For dissections, see Pl. cccxiv.

9. Ficus retusa, *Linn.*—A large tree, quite glabrous, leaves from broadly obovate or nearly orbicular to obovate-oblong, obtuse or obtusely acuminate, $1\frac{1}{2}$ to $2\frac{1}{2}$ inches long, 3-nerved at the base, the primary veins rather numerous, oblique, and joining in a continuous vein near the margin. Petioles stout, 2 to 4 lines long. Figs globular, about 4 lines diameter, closely sessile, solitary or in pairs in the axils of the leaves, the subtending bracts rather large. F. nitida, *Thunb*;—*Wight. Ic. t.* 642. Urostigma pisiferum, U. ovoideum, U. nitidum, and U. retusum, *Miq. in Lond. Journ. Bot.* vi. 580, 581 *and* 582;—*Benth. Fl. Hong Kong* 327. F. Benjaminea, *Roxb. l. c. p.* 550.

A very common tree in subalpine tracts, called Yerra juvi in Teligu; found throughout India, also in China and the Archipelago.

10. Ficus Benjaminea, *Linn.*—A tree, branches slender flexuose weak hanging, petioles round 6-9 lines long, leaves ovate or elliptic-ovate acuminate, coriaceous surrounded by a smooth margin, 2-$3\frac{1}{2}$ inches long by 1-$1\frac{1}{2}$ broad, veins capillary horizontal looped at the margin; figs sessile axillary the size of a pea, bracts 3 ovate obtuse deciduous sericeous on the back, fruit smooth shining greenish-yellow with a tinge of purple. *Linn. Mantess. p.* 129. Urostigma, *Miq.* Ficus pendula, *Link.* Ficus striata, *Roth. Nov. Spec.* 387.

Canara and Bombay ghats, also in Java.

11. Ficus nervosa, *Roth.*—A large tree glabrous, leaves alternate or sub-opposite oblong acuminate smooth and shining above entire slightly 3-nerved at the base, 4-8 inches long, primary veins very prominent beneath, petioles 3-8 lines long, figs axillary solitary or paired turbinate smooth 4-5 lines in diameter, peduncles 3-5 lines long. *Roth. Nov. Pl. Sp.* 388. Urostigma, *Miq.* Ficus angustifolia, *Roxb. Fl. Ind.* iii. 554;—*Wight Icones* 660. Urostigma modesta, *Miq. l. c.*?

Malabar and Western ghats and Ceylon, up to 5000 feet, also in N. India.

12. Ficus comosa, *Roxb.*—A good sized tree with a large spreading shady top, bark pretty smooth, branches slender and often pendulous, leaves alternate oval obliquely-pointed entire firm smooth and shining coriaceous, 2-4 inches long, petioles very slender puberulous about 1 inch long grooved, figs terminal or in the exterior axils paired sessile turbinate as large as a gooseberry

apex depressed with the umbilicus rising a little in the centre which is shut up with scales, contracted at the base, smooth when ripe yellow, involucre 3-leaved. *Roxb. Fl. Ind.* iii. 552 ;—*Wight Icones tab.* 658. Urostigma pseudo-Benjamineum, *Miq. l. c.*

Mountains on the east side of the Presidency, Tinnevelly hills.

§ Sec. Ficus.—*Stigma short 2-cleft.*

13. Ficus asperima, *Roxb.*—A large tree, trunk erect, branches numerous spreading into a large head, leaves alternate about the ends of the branches broad oval obtusely pointed sometimes notched and even lobate, very scabrous a little wrinkled 3-nerved, 4-6 inches long, petioles about 1 inch long scabrous, figs axillary paired peduncled downy size of a gooseberry, yellow when ripe. *Roxb. Fl. Ind.* iii. 554 ;—*Wight Icones* 633.

Common in this Presidency, in Bombay, and in Ceylon ; called in the latter island Seerwana-maddeya ; the leaves are used as a substitute for sand-paper.

14. Ficus cinerascens, *Thw.*—A very large tree, ramuli asperulous, leaves coriaceous elliptic or oblong obtusely and very shortly acuminate glabrous above shining, paler beneath, punctato-asperulous, sub 3-nerved at the base rounded or a little narrowed, 3-6 inches long by 1½-3 inches broad, primary veins 9-12 on each side, petiole ½-1 inch long asperulous. Figs axillary 1 inch long spherical scabrous, 3-bracteated, peduncles solitary shorter than the petiole, calyx 5-leaved, stigma elongate. *Thw. En. Pl. Zey. p.* 266.

Ceylon, warmer parts of the island, called Wal-wona.

15. Ficus biglandulosa, *Miq.*—A tree, young shoots scabrous, leaves alternate short petioled oblong somewhat 3-nerved repand-serrate acuminate scabrous on both sides, 3-6 inches long, 1½-3 broad, furnished with 2 glands at the base, figs axillary solitary or in pairs peduncled rough the size of a small pea, umbilicus small depressed and shut with colored scales. *Miq. l. c.* 229. Ficus exasperata, *Roxb. Fl. Ind.* iii. 555 not *Vahl* ;—*Wight Icones* 664.

Mountains on the east side of the Presidency ; the leaves are used to polish ivory.

16. Ficus parasitica, *Kœnig.*—A large tree, with a very spreading top and small pendulous roots issuing from the larger branches, leaves alternate obliquely oval or rhomboid, obtusely pointed a little scolloped very scabrous, 3-6 inches long by 1½-4 broad, often very unequal-sided, petioles channelled 2-3 lines long, figs paired axillary peduncled when ripe smooth yellow and as large as a pea, peduncles 2 lines long 3-bracteated at the base. *Kœnig. Miq. l. c.* F. ampelos, *Roxb. Fl. Ind.* iii. 553. F. pervia, *Miq. l. c.* F. cuspidifera, *Miq. l. c.* Ficus uniglandulosa, *Wall.* F. sclerophylla, *Roxb. l. c.* 546 ?

A very common tree throughout this presidency, and Ceylon and Bengal ; the leaves are used to polish ivory.

17. Ficus tuberculata, *Roxb.*—A small ramous tree, leaves rough oblong with a short acumen, entire 3-4½ inches long by ¾ to 1½ inches broad, petioles 3-8 lines long, figs paired axillary on peduncles 2-3 lines long, roundish, the size of a pea, tubercled with an elevated umbilicus. *Roxb. Fl. Ind.* iii. 554.

On the mountains on the east side of the presidency, called Kondà juvi in Teligu.

§ 3. Sec. Covellia.—*Stigma peltate concave.*

18. Ficus cunia, *Buch.*—A small or middling sized tree, leaves short petioled alternate oblongo-lanceolate cuneate or semicordate at the base, the lower half protruding in a large rounded lobe which is longer than the petiole, margins a little waved and serrated, scabrous on both sides, 6-12 inches long by 2-4 inches broad, figs peduncled somewhat turbinate a little ribbed of the size of a large filbert, hairy, in pairs or threes on long procumbent radicle and cauline compound leafless racemes often some feet long. *Roxb. Fl. Ind.* iii. 561. Covellia, *Miq. l. c.*

This tree I have only found on our eastern mountains, but it is common in Bengal, Birmah, Jubbulpore, &c ; its foliage is very beautiful.

19. Ficus hispida, *Linn. f.*—A small tree, the young branches hispid, leaves mostly opposite, petioled, from ovate or obovate to oblong, shortly acuminate, 5 or 6 inches long, crenate-serrate, very rough on both sides with short stiff hairs. Figs mostly on the old wood, 2 or 3 together on old spurs, which grow out into leafless branches of 1-2 inches, nearly globose, full ¾ inch diameter, shortly but densely hirsute, on short peduncles, bracteate at the top. Female perianth truncate, nearly as long as the ovary, but so thin and transparent that it is easily overlooked. Style short, with a concave peltate stigma. F. oppositifolia, *Roxb. Pl. Corom. t.* 124 ;—*Wight Ic. t.* 638. Covellia oppositifolia, *Gasp.* ;—*Miq. in Lond. Journ. Bot.* vii. 461 and C. hispida, *Miq. l. c.* 462 ;—*Benth. Fl. Hongkong.* 329. C. dæmomum, *Miq. l. c.* F. dæmona, *Roxb. Fl. Ind.* iii. 462 ;—*Wight Icones.* 641. C. Assamica, *Miq. l. c.* C. dasycarpa, *Miq. l. c.* 465.

Very common throughout India and Ceylon, also in Java, S. China and the Archipelago.

20. Ficus glomerata, *Willd.*—A large tree, bark rusty greenish and scabrous, leaves alternate broad lanceolate entire smooth on both sides, beneath with minute green dots 4-6 inches long by 2-2½ inches broad, petioles channelled 1-2 inches long; racemes compound or panicled issuing from the trunk or large branches, branchlets spreading and jointed, bracts several surrounding the

joints, figs peduncled downy turbinate 1½ inches long when ripe orange colored, umbilicus closed with many scales, involucre of the fruit 3-leaved. *Roxb. Fl. Ind.* iii. 558 ;—*Wight Icones* 667. Covellia, *Miq. l. c.*

A common tree generally on banks of rivers.

LAPORTEA. Gaudich.

For Gen. Char. see letter-press to Pl. cccvi.

1. Laportea crenulata, *Roxb.*—For description, &c. see Pl. cccvi.

BOHMERIA. Jacq.

Gen. Char. Flowers monœcious or diœcious in small dense unisexual heads, spikes or panicles. *Male* calyx or perianth usually of 4 (rarely 3) segments valvate in the bud with 4 (rarely 3) stamens. *Female* calyx enclosing the ovary 2-4-toothed. Ovary 1-celled with 1 erect ovule. Stigma subulate continuous with the ovary and persistent, fruit a seed-like nut enclosed in the thin calyx, seed albuminous. Small trees, shrubs or under shrubs, leaves alternate or opposite usually toothed. *Jacq. Stirp. Amer. Hist. p.* 216. Splitgerbera *Miq.*

1. Bohmeria Travancorica, *Bedd.*—A small weak tree, diœcious, ramuli pilose, leaves ovato-elliptic, with a longish acumination, serrate except at the base, 3-nerved in age glabrous above but (under the lens) densely covered with minute white dots, pilose beneath, 4-9 inches long (without the petiole) by 1½-3½ inches broad, petioles pilose, alternately very unequal, the longer ones 2½-4 inches, the shorter ½-1 inch long, flowers in both sexes in very small dense axillary heads 10-20 flowered, the female sessile, the male on pedicels scarcely ½ a line long. *Male* calyx 4-parted pilose on the outside, stamens 4 round the small rudiment of an ovary. *Female* calyx bracteolate at the base, subentire or inconspicuously 2-toothed at the apex above the ovary. Style very long pilose.

Travancore mountains, South Canara ghats, and on the Brumagherry hills, Wynaad, up to 4500 feet elevation.

Analysis, Pl. XXVII, fig. 2.

(Incorrectly under the name of B. ramiflora, which should be altered.)

1. Portion of a branch of the male tree in flower, leaves 3-nerved, flowers in dense axillary heads.
2. A male flower bud, segments valvate.
3. A male flower open.
4. A male flower 4-sepaled, shewing the insertion of the 4 stamens round the abortive ovary.
5. Anther, front view.
6. Anther, back view.
7. Portion of a branch of the female tree in flower, and shewing how very unequal the alternate petioles are.
8. Highly magnified head of female flowers.
9. A female flower and bract.
10. The same more advanced, cut open to shew the ovary.
11. Vertical section of the ovary 1-celled, 1 erect ovule.

OREOCNIDE. Miquel.

Gen. Char. Flowers diœcious in little axillary or lateral capitate clusters which are either sessile or on clustered or solitary peduncles. *Male* perianth 4-(rarely 3)-parted, segments valvate in the bud, stamens as many inserted round the small obovate rudiment of a pistil. *Female* perianth adnate to the ovary tubular ventricose minutely 4-5-toothed at the apex. Ovary 1-celled with 1 erect ovule. Stigma disk-shaped subpeltate long-ciliate, fruit dry adhering to the somewhat succulent perianth. Seed albuminous. Small weak trees or shrubs, leaves alternate entire or crenulate penniveined or 3-nerved glabrous or pubescent, female flowers arising from little fleshy cup-like beds and furnished with numerous bracts. *Miquel. Pl. Jungh.* i. *p.* 39. Villebrunea, *Gaudich. Bot. Voy. B. t.* 91, 92 ;—*Bl. Mus. Bot.* 2 *p.* 166.

1. Oreocnide sylvatica, *Miq.*—A small weak tree, young ramuli strigose, leaves oblongo-elliptic with a long acumination, penniveined, obsoletely crenulate towards the apex, 5-8 inches long by 1½-2¼ inches broad, primary veins 6-7 on each side, above glabrous, furnished with minute white dots, (under the lens), beneath strigose on the costa and veins, petioles strigose, unequal in length, ½-1½ inches long. Stipules linear lanceolate acuminate subscariose 3 4 lines long soon caducous but present at the apexes of the branches, peduncles axillary strigose twin dichotomous or more compound shorter than the petioles. *Miq. l. c. p.* 40. Urtica sylvatica, *Bl. Bijdr. p.* 506. Boehmeria sylvatica, *Hassk.* Villebrunia sylvatica, *Bl. Mus. Bot.* ii. *p.* 165 *tab.* 15 ;—*DC. Prod.* xvi. 235[21], and V. appendiculata, *DC. l. c.*?

Common in Coorg and on the South Canara ghats ; also in Ceylon and Java. I have only the male plant, and my analysis of the female is taken from Blume.

(Oreocnide frutescens is a small under shrub (with 3-nerved leaves) found on our Western ghats.)

Analysis, Pl. XXVI, fig. 4.

1. Portion of female branch in flower.
2. Male inflorescence magnified.
3. A male flower.
4. A male flower open.
5, 6. Anthers, front and back view (drawn from dried specimens).
7. Female inflorescence magnified,
8, 9. Young fruit.
10. Vertical section of the ovary (the ovule should appear erect, not pendulous.)
11. Vertical section of fruit.
12. Transverse section of fruit.
13. Seed. (All from Blume's figure.)

MOROCARPUS.

Gen. Char. Flowers monœcious or diœcious, densely capitate surrounded by bracteoles. *Male* calyx 4-3-parted, segments equal, valvate in the bud, stamens 4-3 opposite the calyx-segments, filaments filiform, anthers introrse 2-celled fixed at the back, cells opposite, rudiment of pistil small. *Female* calyx turbinate closely cohering to the ovary, constricted above and obsoletely 3-4-toothed. Ovary attenuated below into a stipe (adnate with the calyx) straight or a little oblique 1-celled, ovule 1 erect from the base orthotropal, stigma terminal sessile, very shortly apiculate or obtuse, papillosely ciliate, berry pyriform succulent; embryo inverse in fleshy albumen, cotyledons plano-convex, radicle short superior. Weak trees or shrubs, leaves alternate serrate, often rugose beneath snowy or hoary-tomentose receptacle of the fruit scarcely fleshy. *Sieb. et Zucc.* Debregeasia, *Gaud. Bot. Voy. Bon. t.* 90.

1. Morocarpus longifolius, *Burm.*—A small erect weak tree, leaves lanceolate acute or acuminate 3-nerved, sharply serrate rugose above prominently reticulated, strigose on both sides, snow-white beneath, inflorescence axillary cymose, fruit capitate yellow made up of an aggregation of small globose drupes. Sarcocarp fibrous pulpy studded over with resinous tubercles. Urtica longifolia, *Burm. Fl. Ind. p.* 197. Morocarpus, *Bl. l. c.* Debregeasia velutina, *Gaud.* Conocephalus niveus, *Wight Icones* 1959. Missiessya velutina, *Wedd.*

Very common in our western jungles up to 7000 feet, also in Ceylon, North India and Java; in Ceylon it is called Gass-dool, and fishing lines are made of the bark.

Analysis, Pl. XXVI, fig. 5.

1. A portion of a male branch in flower.
2. Male inflorescence.
3. Male flower bud.
4. A male full flower.
5. Portion of a female branch in flower.
6. Inflorescence.
7. Portion of the same cut vertically.
8. Portion of the same highly magnified.
9. Female flower.
10, 11. Sections of the same. (Drawn from living specimens.)

This order is represented in our western moist forests by numerous herbaceous plants belonging to the following genera. In *Artocarpeæ*, Dorstenia and Pogonotrophe, and in *Euurticeæ*, Fleurya, Gerardinia, Pilea, Lecanthus, Pellionia, Elatostema, Procris, Chamabainia, Pouzolzia, Memorialis, and Droguetia.

ORDER LXXI.—CASUARINACEÆ.

Branching weeping trees, with jointed shoots, the internodes of which are striated. Leaves 0; in their room short, toothed, ribbed sheaths. Flowers male and female, each with a single bract. Male in spikes. Flowers whorled about the articulations of the jointed rachis. Bracts 2, membranous, right and left of a two-leaved calyx, the sepals of which stand fore and after, and adhere at their points, and at the time of flowering are separated from their bases and carried up by the stamen in the form of a calyptra to the anther. Stamen 1; filament subulate; anther erect, two-celled, with parallel contiguous cells opening by a longitudinal fissure. Female in dense heads. Rachis not jointed. Calyx 0. Ovary one-celled, with one obliquely ascending orthotropal ovule, or two standing side by side. Style 2, united at the base. Caryopsides winged, collected in a cone, hidden in thickened bracts, sessile. Seed erect, coated densely with spiral vessels, without albumen; radicle superior.

CASUARINA. Linn.

Gen. Char. the same as that of the order.

The Casuarinas are none of them indigenous to Southern Indian. Casuarina equestifolia (of which C. muricata is a synonym) is very common, particularly near the sea coast throughout India, and in fact in all tropical countries, but it was introduced into this Presidency about 70 years ago from the Archipelago or Chittagong; it yields a strong fibrous and stiff timber of a light reddish brown color, capable of sustaining a great cross strain; a cubic foot unseasoned weighs 63-68 lbs. and 55 lbs. when seasoned, and its specific gravity is ·880; it is extensively grown for firewood, and there are large plantations on the sea coast near Madras and in the sandy beds of rivers inland.

Casuarina stricta, quadrivalvis, paludosa and leptoclada have been introduced on to the Nilgiris from Australia.

SUB CLASS IV, GYMNOSPERMÆ.

ORDER LXXII.—CYCADACEÆ.

Small trees or shrubs, sometimes resembling Palm trees in their aspect. The stems are either simple and cylindrical, or spheroidal, or dichotomously branched, and in all cases strongly marked with the lozenge-shaped scars of broad woody leaf-stalks. Internally the stem consists of a mass of pith traversed by woody bundles and rings of woody matter, sometimes irregularly disposed, sometimes collected into regular and numerous concentrical circles, always pierced by medullary plates. The wood consists of glandular woody tissue and spiral vessels. The leaves are pinnated, hard and woody, perennial, generally circinate when young but in some instances flat; the leaflets have fine simple veins, and are placed somewhat obliquely on their petiole, from which they finally disarticulate. Flowers male, female, perfectly destitute of all trace of calyx and corolla. Male collected in terminal cones, consisting of scales covered over their lower side with anthers which are one-celled, often collected in twos and threes, and split longitudinally. Pollen hyaline angular, collected in masses. Female consisting of naked ovules, placed beneath peltate scales, or at the base of flat ones, or on the margins of contracted leaves. Seeds hard or spongy-coated nuts, with one or more embryos suspended by a long funiculus in a central cavity of large white fleshy or mealy albumen; the cotyledons unequal, more or less connate; radicle superior.

CYCAS. Linn.

Gen. Char. Male ament strobile-shaped, its imbricate acute pointed scales covered on the under side with distinct sessile 1-celled 2-valved anthers. *Female*, the imbricate spadices with 2-6 solitary distant alternate or opposite more or less immersed naked 1-celled ovules, the apex sterile and pinnatifid, serrate or subentire. Palm-like small trees or shrubs with much the appearance of ferns, leaves pinnatifid or subpinnate, leaflets or segments 1-nerved, petiole often spiny, vernation of the rachis straight, of the leaves or segments circinate.

1. Cycas Rumphii, *Miq.*—A small palm-like tree seldom more than a few feet high, trunk sometimes branched, leaves spreading round the crown numerous subpinnate of a smooth shining deep green 3 to 6 feet long, leaflets or rather segments 50-60 on each side rather remote opposite or alternate, linear-lanceolate sickle-shaped acute flat very smooth and entire, 4-10 inches long and ½ an inch broad, petioles nearly round smooth 12-24 inches of the base destitute of leaves and often armed with a row of short sharp spines on each side. *Male* strobile elevated on a short thick firm peduncle from the crown of the plant ovate oblong, being at first 9-10 inches long, at length double as long, by 5 inches in diameter, scales numerous imbricate wedge-shaped obliquely truncate, fulvo-tomentose with a large erect subulate point from the exterior upper angle, anthers entirely covering the under surface of the scale 1-celled 2-valved. *Female* spadices the outer elongate narrow cuspidate villous and barren, the inner compressed clavate spathulate 2-edged and bearing on each side about the middle 2-3 round smooth ovaries, style minute with a perforated callous margined stigma, spadex incurved towards the apex and of a dilated rhomboid-shape, the exterior margins pinnatifid or subentire, fruit oval size of a small pullet's egg smooth yellow. *Miq. in Bull. Sc. Phys. et Nat. Neerl. p.* 45, C. circinalis, *Roxb. Fl. Ind.* iii. 744.

Cultivated in gardens, but probably an introduction from the Moluccas.

2. Cycas circinalis, *Linn.*—Very similar to the last, leaflets or segments 80-100 pair generally smaller than in the last and the petioles longer and more armed. *Male* scales tapering from the middle into very long incurved subulate points. Female spadices with 3-6 ovaries on each side, beyond which they rise in a curve and expand into an ovato-triangular-shape with long subulate points and the margins deeply and acutely toothed, the rest as in Rumphii. *Linn. Sp. Pl.* Todda panna, *Rheed. Mal.* 3 *p.* 9. Cycas sphærica, *Roxb. Fl. Ind.* iii. 747.

Very common in all our dry subalpine forests on the west side of the Presidency up to 3500 feet elevation. Some of the hill tribes in the Anamallays and elsewhere almost live upon the flour obtained from the seeds when in season.

A third species, which I take to be C. revoluta, is common on the Cuddapah and other hills on the east side of the presidency; its leaflets are very narrow with revolute margins, and the costa most prominent and raised beneath. I have however never seen it in flower.

ORDER LXXIII—CONIFERÆ.

Flowers monœcious or dicœcious, in cylindrical or short catkins, with closely packed scales, or the females solitary. Stamens inserted either on the axis of the catkin under the scales, or the anther-cells sessile on the inside of the scales themselves, which then form part of the stamens. Ovules and seeds *naked*, that is, without ovary, style or pericarp, either inserted under the catkin-scales or solitary and quite exposed. Seeds albuminous. Embryo axile, usually with 3 or more cotyledons. Trees or shrubs, mostly with resinous secretions. Leaves stiff entire lanceolate subulate or linear, or short and scale-like or lobed or divided.

PODOCARPUS. Herit.

For Gen. Char. see letter-press to Pl. cclvii.

1. Podocarpus latifolia, *Wall.*—For description, &c. see Pl. cclvii.

This is the only tree of the order indigenous in Southern India. Numerous species of Araucaria, Cupressus and Pinus have been introduced chiefly on to our mountains, and the following genera are also represented—Dammara, Cedrus, Sequoia, Cryptomeria, Frenela, Callitris, Thuya and Juniperus.

CLASS II.—MONOCOTYLEDONS.

ORDER LXXIV.—PALMÆ.

Flowers unisexual or polygamous. Perianth dry and calyx-like of 6 lobes or segments, in 2 distinct series, contorted or valvate in the bud. Stamens 6, or rarely more, or 3 only. Anthers versatile, 2-celled. Pistil usually of 3 carpels, free or united in a 3-celled ovary. Ovules solitary or rarely 2 in each cell, erect. Stigmas 3, usually sessile, undivided. Fruit either a 3-celled or 1-celled drupe or berry, or of three distinct drupes or berries. Seed erect or laterally attached. Embryo small, in a cavity near the outside of a hard albumen. Stems woody, usually simple and often attaining a great height. Leaves large, usually at the summit of the stem, folded in the bud, and pinnately or palmately divided. Flowers usually sessile, in simple or paniculate spikes, enclosed when young in large sheathing bracts, called spathas, and usually with 3 small bracts or bracteoles under each flower.

It is not intended to figure or describe the Palms in this work, as I have not the material to attempt it. We have at least 7 or 8 species of Calamus (rattans) in our western jungles, and 7 species, nearly all distinct from ours, inhabit Ceylon. Caryota urens (the bastard Sago), Corypha umbraculifera (the Talipot), several species of Phœnix (date), a small Areca, 1 species of Arenga and Bentinckia Condapana inhabit our forests; the latter is confined to South Tinnevelly and Travancore. Corypha Areca and Arenga are only found in our western moist forests, but the others are general over the Presidency, and in Ceylon Ptychosperma rupicola and Oncosperma fasciculata and Areca concinna are small indigenous palms. Borassus flabelliformis (the Palmyra), Cocos nucifera (the Cocoanut), and Phœnix sylvestris (date), are largely planted throughout India, chiefly near the coast, and Areca catechu (the Areca-nut) also forms plantations.

ORDER LXXV.—PANDANACEÆ.

Flowers unisexual, densely sessile, in simple or branched spikes or heads. Perianth none or rarely 3 or 4 valvate sepals. Male flowers: Stamens several, filaments filiform. Anthers 2 or 4-celled. Female flowers: Ovaries 1-celled, entire, with 1 laterally inserted ovule or with many ovules on parietal placentas. Stigma usually sessile. Fruit a berry or drupe. Embryo small, in the base of a fleshy or horny albumen. Stems herbaceous, shrubby or arborescent, often branched. Leaves entire or divided.

PANDANUS. Linn.

Gen. Char. Flowers dicœcious. Males in small dense spikes, sessile in the axils of leafy or coloured bracts, forming a terminal compound spike. Stamens indefinite. Anthers 2-celled. Female flowers: Ovaries very numerous, densely packed in a globular or oblong spike or head, with 1 ascending ovule in each. Stigmas sessile on the flat tops. Drupes cohering in clusters in a large cone-like head. Stem arborescent, branching. Leaves long, linear-lanceolate, coriaceous prickly on the midrib and edges, spreading and generally closely inserted round the stem in 3 spiral series.

The Screw pines, often called swamp pine-apples, or Kildàr (the native name), scarcely deserve a place in this work, the substance of the most solid wood being something like that of a cabbage stalk, which by age has acquired a woody hardness outside; there are 2 species common all over the Presidency, Pandanus odoratissimus, *Willd*, and Pandanus furcatus, *Roxb.*

ORDER LXXVI.—GRAMINEÆ.

Flowers hermaphrodite or unisexual, in *spikelets* without any perianth. Each spikelet consists of 3 or more (very rarely 2 or 1) chaff-like concave *glumes* (scales or bracts) arranged alternately on opposite sides of the spikelet, their concave face towards the axis (Two sometimes 1 or 3) lowest glumes empty and often differently shaped from the others, the succeeding or *flowering glumes (lower paleæ)*, each enclosing a smaller scale or *palea* (upper palea) placed either between the glume and the axis of the spikelet, with its back to the axis, or nearly opposite the glume at the end of the axis. Within the palea, or apparently between the flowering glume and palea, is the real flower, consisting usually of 2 *lodicules* or minute microscopical scales besides the stamens and pistil. The flowering glume and palea are however generally included in the term flower. Stamens usually 3, occasionally reduced to 2 or 1, or in some genera 6 or more; anthers versatile, 2-celled. Ovary 1-celled, with 1 ovule. Style 2 or 3-lobed, or more frequently divided to the base into 2 or 3 more or less feathery styles. Fruit 1-seeded and seed-like, called a *grain* or *caryopsis*, free or adhering to the persistent palea, or enclosed in the hardened palea and flowering glume. Pericarp very thin, adhering to the seed or rarely loose or opening in 2 valves. Embryo small, at the base of a mealy albumen. Herbs, with stems usually hollow except at the nodes, sometimes shrubby or arborescent in their stature and hardness of the stem, but very unlike dicotyledonous trees or shrubs. Leaves alternate entire parallel-veined (usually long and narrow), sheathing the stem at their base, but the sheaths split open on the side opposite the blade and often end within the base of the blade in a scarious appendage called a ligula. Spikelets arranged in terminal spikes, racemes, or panicles.

TRIBE BAMBUSACEÆ.

Arborescent or shrubby grasses, culms up to 120 feet high or even more, sometimes scandent hollow or rarely nearly solid generally much branched at the nodes, thorny or unarmed, leaves articulated at the base, often deciduous at an early date. Sheath generally fimbriate at the apex, ligula always present. Spikelets several or many-flowered, never 1-flowered, the lower palea many-

nerved, the upper one 2-6-many-nerved keeled or without a keel, very rarely absent. Scales 3 sometimes many or by abortion 2 or none. Stamens 3-6-or many (in Beesha), filaments free at the base or monadelphous. Style 2-3-4-fid or divided to the base, caryopsis free or (in the Section Bacciferæ) included in the perigynium.

§ *Section I.*—TRIGLOSSÆ.

Culms unarmed, shrubby scarcely arborescent often scandent, spikelets many or few flowered, the upper palea always 2-keeled. Stamens 3 free at the base, connective never elongated, scales 3 always present, style 2-3 parted from above the base, caryopsis oval oblong or linear-oblong, scutellum exposed.

ARUNDINARIA.

§ *Section II.*—BAMBUSEÆ.

Culms armed or unarmed thick hollow or rarely solid, arborescent lofty or rarely shrubby, spikelets many flowered often many bracteated, upper palea concave and 2-keeled or convex and keelless. Stamens 6, filaments free or monadelphous, connective obtuse or apiculate; scales 3 or by abortion 2 or rarely altogether wanting, style short trifid, or more or less lengthened and simple, the apex only 2-3 cleft, caryopsis oval or oblong or narrow linear-oblong, scutellum exposed.

Stamens 6 free at the base, scales generally 3 normal rarely 1-2-3 abnormal	BAMBUSA.
Stamens 6 monadelphous at the base, spikelets long cylindric narrow, scales none ...	OXYTENANTHERA.

§ *Section III.*—BACCIFERÆ.

Culms unarmed hollow rarely solid, arboreous or shrubby often scandent, stamens 6 or numerous (Beesha) free at the base or monadelphous, connective obtuse or apiculate, scales 3 many or deficient, style long simple included in the beaked perigynium, at length 2-3 cleft, stigmas often revolute. Fruit sometimes large bacciform or pomiform included in the perigynium, scutellum therefore not visible.

Spikelets elongate many-flowered, flowers 3-5 fertile, scales 3, fruit rostrate	TEINOSTACHYUM.
Spikelets subcylindric only 1 floret bipaleaceous and hermathrodite, scales many (or rarely 3), stamens many (or 6), fruit large with a long beak	BEESHA.
Spikelets oblong or ovate, 2 or more florets perfect. Scales none, fruit oblong generally beaked...	DENDROCALAMUS.

All six genera are represented in this Presidency, and all but Dendrocalamus in Ceylon. The largest and most important of our bamboos is the Bambusa arundinacea, this is found throughout our Presidency, and grows to 80 feet high with its culms up to 6 or even 8 inches in diameter, it is a most valuable product, and yields a very considerable revenue to the Forest Department, being in universal use for building purposes, timber rafts, scaffoldings, fencing, trellis-work, furniture, fishing rods, ladders, mats, baskets, window-blinds, and many other purposes; and when it seeds the bamboo-rice (as the natives call the seed) feeds thousands of poor people; the leaves are good fodder, and the young shoots are made into preserves and pickles, and are the most favorite food of elephants. This species is absent from Ceylon, where its place is taken by B. vulgaris. The next in importance is the Dendrocalamus strictus, well known as the *Male bamboo*; this is also a large species, but smaller than the last, and with solid or almost solid stems; it is much in use for spear-shafts and building purposes; it is abundant on the drier slopes of many of our mountains. Arundinaria Wightiana is the hill reed or small hill bamboo so abundant on the higher ranges of the Nilgiris, and much in use for various purposes. Teinostachyum Wightii is the large broad-leaved Elephant reed so common about the lower slopes of the mountains of Coimbatore, Malabar, &c, in moist localities, and Beesha Travancorica is the Elephant grass or Irul of Travancore, a reed which covers immense tracts on the Travancore and Tinnevelly mountains, often to the entire exclusion of all other vegetation. Oxytenanthera Thwaitesii is a large straggling weak thornless reed common about the outskirts of dense moist forests 3500-6000 feet elevation, very abundant on the Anamallays. Bambusa arundinacea dies down after it flowers and springs up again only from seed. A very general flowering takes place almost throughout our western forests about every 30 years, and nothing but dead culms are to be seen over miles of the bamboo tracts, and the forest fires are much intensified; this occurred 3 or 4 years ago all over the Wynaad, Malabar, Coorg and South Canara, extending over a period of 2 or 3 years, and I learn from many quarters that a similar event took place about 30 years ago; and from records I see it occurred also about 1804. The plant takes several years before it again attains any growth from the seed, and its loss is much felt in the meantime; but when the large culms are once shot forth, they grow with great rapidity (sometimes a foot or more in 24 hours.) Every year, however, individual clumps or individual culms are to be found in flower and in a dead or dying state. The male bamboo (Dendrocalamus strictus) flowers every year and does not die down. The Arundinaria Wightiana flowers and dies down annually, springing up again rapidly from the same roots, attaining its full size in one season.

Some species of the tribe flower only at long intervals, and there are several on our mountains which I have never yet procured except in leaf, and which are probably new or at least not identified. One growing over the top of Pedrotalla galle in Ceylon has been watched by Dr Thwaites for many years, and has never yet been found in flower.

Colonel Munro points out in his *Monograph* that the section Bacciferæ differ from the others in their peculiar fruit, the pistil or style generally appears to be contained in an envelope called a perigynium, somewhat analagous to the sac which contains the seed of Carex in the young state; this is so closely attached to the style that it is almost impossible to separate it, but towards maturity it increases in various ways: in Beesha Travancorica it becomes fleshy, and the fruit attains the size of a pullet's egg with a very large beak, the scutellum is concealed in this envelope and not visible externally, whereas in the true bamboos the seed is like oats or wheat, linear or oblongo-linear with a distinct furrow down one side and the scutellum very visible below.

ARUNDINARIA. Michaux.

Gen. Char. Shrubby rarely arboreous, culms erect, branches sometimes fasciculate at the nodes or almost verticellate. Spikelets imperfect above, shortly pedicellate between the glumes 3-5-12-flowered, rachilla articulate, florets imbricate distichous distant bipaleaceous hermathrodite or very rarely the lower male, the upper ones occasionally abortive, glumes very variable acute or obtuse sometimes distant, few-many-nerved, the lower always shorter rarely wanting, lower palea acuminate or acuto-mucronate concave many-nerved glabrous or hirsute membranaceous, the upper one 2-keeled channelled compressed the back narrow. Sides flat connivent, equal or nearly equal to the lower one. Stamens 3 short free, scales 3 conspicuous membranaceous ovate or lanceolate ciliate acute or obtuse, style entire at the base soon dividing into 2-3 plumose stigmas, caryopsis oval or oblong or linear-oblong deeply furrowed on the back. Leaves generally small, the transverse veinlets obscure or conspicuous, inflorescence generally terminal in branched panicles or simple racemes. *Michaux Fl. Bor. Amer.* 1. 74. Miegia, *Pers.*—Ludolfia, *Willd.*—Triglossum, *Fisch.*—Macronax, *Rafin.*

Arundinaria Wightiana, *Nees.*—An erect shrubby reed, culms 6-12 feet high much branched at the nodes, leaves ovate-lanceolate setaceo-acuminate beneath a little glaucous and often glandulose near the costa at the base on the underside, 1½-7 inches long by 3-12 lines broad cuneate at the base and shortly petiolate, the margin membranaceous scabrous with very minute recurved prickly points (under the lens) or quite glabrous in age, primary veins 4-6 on each side, transverse venules pale rather conspicuous. Sheaths striated hispid or glabrous on the same branch, the mouth fimbriate with 1-2-3 long setæ, ligula elongate or very short, panicles terminal 4-8 inches long very compound, the branches capillary and flexuose furnished with glands in the axils, spikelets on long slender pedicels, 2-5 flowered purplish in colour nearly glabrous or slightly hirsute, 4-6 lines long, the rachillæ articulate subclavate scabro-hirsute, glumes nerved acuminate or obtuse ciliate at the apex, the lower one generally acuto-mucronate 2-5-nerved the upper one 7-nerved at the base acuminate, the lower palea 5-7-nerved mucronate scabrous (under the lens), the upper one about as long bicuspidate at the apex without nerves, stamens 3 free, style soon bifid, scales 3 equal and similar ovate obtuse or acute, margins fimbriate, nerved. *Nees in Linnæa* ix. 482 ;—*Munro Monog. p.* 19. A. hispida, *Steud.* A moliniformis, *Hochst.*

This reed is abundant on the higher ranges of the Nilgiris; it is much in use for a variety of purposes.

Analysis, Pl. XXVIII, fig. 2.

1. A spikelet highly magnified.
2, 3. Portions of the same shewing clearly the articulated rachilla.
4. A glume.
5. A lower palea.
6. A fertile floret shewing the upper and lower palea and the articulated rachilla of the abortive terminal floret (which has fallen off.)
7. Side view of the upper palea, the 2 keels ciliate.
8. Inside view of the same, shewing its bifid apex, and the 3 stamens.
9. 2 of the 3 stamens removed from a floret.
10. A fertile floret the palea and 2 of the stamens removed, exposing the 3 large ovate fimbriate scales, the ovary, and deeply bifid style.

2. Arundinaria floribunda, *Thw.*—An erect shrubby reed, culms 2-5 feet high, leaves lanceolate setaceo-acuminate, prickly on the membranaceous margin (under the lens), primary veins 3-4 on each side, transverse venules conspicuous, sheaths striated often hispid when young, in age glabrous, the mouth fimbriate with many long setæ, panicles very compound, terminal, 4-6 inches long, sparingly glandulose in the axils, spikelets lax 4-8 flowered sericeous an inch long or more, glumes unequal, acute, nerved, ciliate at the apex, the lower one smaller 2 lines long ; the lower palea pubescent 3½ lines long nerved subulato-acuminate, the upper one about as long bicuspidate at the apex. Scales 3 unequal 2 obliquely lanceolate, margin ciliate the 3rd narrower, scarcely nerved, ciliate, style soon bifid, stigma beautifully plumose, fruit purple 1¾ lines long linear rather hirsute at the apex crowned with the remains of the bifid style. *Thw. En. Pl. Zey. p.* 375.

Ceylon, central provinces, at 5000 feet elevation. Very like No. 1, but the spikelets longer and silky and containing more flowers.

3. Arundinaria Walkeriana, *Munro.—Culms* ? Leaves ovate or oblongo-ovate with a long sharp acumination, rounded at the base and cucullate just above the short petiole, the margins thickened and asperous with minute recurved prickly points (under the lens) or glabrous in age, primary veins 5-7 on each side, transverse venules very numerous and prominent, 3-7 inches long by ¾-1½ inch broad, sheaths striated glabrous the mouth furnished with very numerous long setæ, panicles very compound 4-5 inches long, the branchlets angled glabrous, glandulose in the lower axils, spikelets colored glabrous 3-4 flowered, 10-12 lines long shortly pedicellate between the glumes, glumes scarcely unequal, the apices ciliate at the margins, the lower one acute with 1 prominent and 4 inconspicuous nerves, the upper one with 3 prominent and 4 inconspicuous nerves acuminate or obtuse, lower palea 9-nerved oblong acute and ciliate, the upper one equal obtuse or bifid at the apex subhirsute 2-keeled, the keels ciliate above. Scales 3 membranaceous obtuse, margins ciliate, 2 larger ; style tumid at the base, soon divided into 2 broad compressed stigmas. *Munro. Monog. p.* 21.

Ceylon, higher parts of the central provinces ; the cartilaginous margin at once distinguishes this, and it has much broader leaves than the other species.

4, Arundinaria debilis, *Thw.*—Culms much elongated glabrous or with the sheaths hispid, leaves small 1½-3 inches long by 3 lines broad furnished with longish white hairs on both sides when young glabrous in age, lanceolate with a setaceous apex somewhat glaucous, primary veins 2 on each side, transverse venules inconspicuous or wanting, sheaths ciliate with 2-4 setæ at the mouth, panicles simple terminal the branchlets short subverticelled few-flowered, spikelets 3-flowered 5-6 lines long, the 2 lower

Bambusa arundinacea. Retz.

See Manual under Bambuseæ.

flowers hermathrodite, glumes subacute mucronate 6-7 nerved pilose the lower a little shorter, lower palea 7-nerved mucronate hirsute at the apex, the upper one acuminate at the apex much shorter than the lower, keels nearly glabrous. Scales unequal narrow, nerves colored. Style soon bifid, stigmas purple. *Thw. En. Pl. Zey. p.* 375.

Ceylon, higher parts of the central provinces; the leaves are used as fodder for horses at Newera Ellya.

Two other species, only known in leaf, occur on the mountains in Ceylon, and I have a seventh species only in leaf from the higher ranges of the Anamallays.

BAMBUSA. Schreb.

Spikelets many or rarely few-flowered, imperfect above and below, cylindrical elongated or ovate or oblong, glumes 2 or many the lower smaller, the lower palea many nerved muticous or mucronate generally glabrous coriaceo-chartaceous, the upper membranaceous narrower nearly as long or longer, 2-keeled, keels not winged but often conspicuously fimbriate, scales 3 generally obtuse ciliate membranaceous, rarely 1-2 wanting, stamens 6 free at the base, anthers obtuse or apiculate or penicellate at the apex. Style rather short soon 3-cleft nearly to the base or subbulbous at the base and not so deeply 2-3 cleft, or long simple only divided at the apex into 2-3 stigmas, stigmas short or long plumose or pilose, ovary obovate hirsute at the apex or linear-oblong or beaked, caryopsis linear-oblong obtuse or acute conspicuously marked with a longitudinal furrow generally closely shut in the upper palea. Arboreous or rarely shrubby, sometimes scandent, often thorny, much branched at the nodes, leaves various narrow or broad, transverse veinlets none or conspicuous, sheaths generally fimbriate at the mouth, inflorescence clustered along the branches of a panicle, which is also generally clustered. *Schreber. Gen. Pl. No.* 607.

1. Bambusa arundinacea, *Retz.*—Culms 12 to 100 from the same root up to 80 feet high or even more, hollow, jointed, undivided but with innumerable very ramous spreading branches, thorns double and triple alternate on the joints of the branches and branchlets, when double a branchlet occupies the centre, when triple the largest is in the centre, all strong sharp and somewhat recurved, (sometimes wanting, particularly in rich soils?), leaves sheathing bifarious short petioled linear lanceolate, the upper side and margins backwardly hispid, broad at the base finely pointed at the apex, 2-6 inches long, $\frac{1}{2}$-$\frac{3}{4}$ inch broad (rarely larger), sheaths somewhat downy with a few short bent bristles on each side of the mouth, the spathes, which are soon deciduous, are very large up to $1\frac{1}{2}$ feet long, glaucous on the inside, the apex with a long fine point; *inflorescence* when in flower it is generally destitute of leaves and as the extremity of every ramification is covered with flowers, the whole tree seems one entire immense panicle composed of innumerable somewhat verticelled spikes, each verticel being composed of several distichous oblong pointed sessile rigid spikelets which are 8-12 lines long 6-12 flowered, the fertile flowers 3-7 about the centre, the lower palea smooth at the base, nerved above, acuminate or mucronate glabrous or sometimes slightly fimbriate at the margin, the upper palea often longer, the margins inflected concave behind and fringed with hairs round the keels or margins of the concavity, scales 3 generally unequal and dissimilar, 2 broad and obtuse the 3rd lanceolate all ciliate. Stamens 6 free at the base, connective obtuse or appendiculate, style subbulbous at the base soon deeply divided into 2-3 plumose stigmas, caryopsis linear-oblong enclosed in the upper palea in size and appearance like a grain of oats. *Willd. Sp. Pl.* ii. 245;—*Roxb. Fl. Ind.* ii. 191. See Pl. cccxxi.

Analysis.

1. A spikelet.
2. Two fertile florets removed from the same, the upper palea longer than the lower.
3. A fertile floret after the stamens have protruded, at the left hand side at the base can be seen a rachilla.
4. One of the upper palea perfectly glabrous and with glabrous margins, sometimes one of the margins are a little hairy.
5. A floret the lower palea removed, showing that the upper palea is very concave on the back and the edges of the concavity prominently ciliated.
6. A floret the upper palea removed, showing a lower palea (minutely ciliate on one margin), 6 free stamens, 1 style with 3 long plumose stigmas and three scales or squamulæ round the base of the ovary, these are ovate and subequal, or one is narrower than the other two.
7. Ovary and style and 1 of the stamens from a flower (before maturity), the style is hairy and appears entire not having as yet split into 3 stigmas at the apex, the stamens quite free even at the very base, ovary hairy at the apex.

8, 9. Anthers, front and back view, a small hairy apiculation at the apex.

10. Nearly ripe caryopsis (or bamboo-rice), crowned by the style and stigmas, these break off before maturity.
11. One of the scales or squamulæ. (All drawn from living specimens collected on the eastern slopes of the Nilgiris.)

For remarks on this species see notes at the head of this Order. It is called Bàns in Hindustani, Mungil in Tamil, and Vedro in Teligu. A substance called Tabaseer (a siliceous concretion) is found in the hollow culms of this and some other bamboos; it is called Vedro pàl (bamboo milk) in Teligu, and Mungil upoo (bamboo salt) in Tamil; it is employed to cure paralytic complaints, and as a stimulant and aphrodisiac. This bamboo is most abundant throughout this Presidency in the plains and up to elevations of 3000 feet, also in Bombay; it occurs, I believe, also in Bengal, but there its place is generally taken by B. tulda, B. Balcooa, and B. spinosa. Long immersion in water renders bamboos much firmer; it is also said to make them proof against attacks of the Bostrichi and their larva which so often attack them. The natives have an idea that fever is much severer in those years in which a general seeding takes place; they however gorge themselves with the rice, which is very heating and apt to bring on both dysentery and fever.

2. Bambusa orientalis, *Nees.*—I have no specimens of this bamboo; it is said to differ from No. 1 in the rachis of the panicle being angled and slightly puberulous, and in being of a glaucous-green color; the spikelets are submembranaceous instead of coriaceous, 7-9 lines long and 5-8 flowered, with 3-5 fertile flowers; it has been found at Quilon and on the Nilgiris.

3. Bambusa spinosa, *Roxb.*—Culms not so hollow as in No. 1, densely cæspitose 30-50 feet high or even more; spines at the joints and very generally present throughout the whole plant, triple, the middle one the largest and often compound, all more

or less recurved very strong and sharp, sometimes 1 or 2 absent, leaves sessile on their sheaths bifarious linear lanceolate cuspidate generally about 6 inches long sometimes pilose beneath, the sheaths ciliate at the mouth, *inflorescence*, the clump when in flower forms one immense naked panicle, the plant being leafless at that time, spikelets coriaceous often monœcious crowded on the joints of the extreme branchlets, sessile lanceolate often densely glomerato-verticellate (sometimes with heads aggregated at the base of the branches and 1 inch in diameter), 5-6 lines long, 4-6 flowered, the centre 2 3 generally fertile ; lower palea smooth hard and pointed, the margins fimbriate or smooth, the upper as long or longer than the lower in the male flowers but shorter in the female, concave behind, margins incurved, the edges of the cavity much ciliate, scales 3, two oval the 3rd lanceolate, ciliate. Stamens 6 free, the connective elongate, style conico-bulbous at the base soon trifid, or rarely only bifid nearly to the base. *Roxb. Fl. Ind.* ii. 199. Bambusa arundinacea, *Thw.* not *Retz*;—*Munro. Monog. p.* 105.

This species is found on the mountains on the north-eastern side of our Presidency and also in Ceylon, but I have not seen it in our western forests ; it is best distinguished from arundinacea in having a paler colored more striated panicle, smaller and more coriaceous spiculæ, and fewer flowers, generally smaller leaves which are often hairy on the outside, and with the petiole sometimes much swollen at the base. In Ceylon it is called Kattoo-oonà and the seeds are eaten.

4. Bambusa vulgaris, *Wendl.*—This is the common Ceylon species called Oonà in that island ; it is sometimes cultivated in India and elsewhere in the tropics ; it is unarmed, the culms being intensely yellow or green or mottled green and yellow, and considerably smaller than arundinacea ; the spiculæ are oblong and subcompressed looking almost as if bifid, the lower palea is rather attenuated at the base, the upper one fimbriated at the margin, the anthers are apiculated with short hairs, and the style is very different to the three last, in this it is long and simple and hirsute, divided only at the apex into 2-3 stigmas, the leaves are up to a foot long by 2 inches wide. Bambusa Thouarsii, *Kunth.*

Bambusa Balcooa, *Roxb.*, and B. tulda, *Roxb.*, common Bengal species, do not I believe occur anywhere in this Presidency. Other species inhabiting the Bengal mountains are B. nutans, *Wall*, B. teres, *Wall*, B. Falconeri, *Munro*, B. pallida, *Munro*, B. Khasiana, *Munro*, and several other species inhabit Birmah. It is highly desirable that the seeds of all the species should be freely circulated by forest officers to different Presidencies and districts. Some of our species would be valuable introductions in Bengal, and all the Bengal and Birmah species would be most valuable introductions in our Presidency. Bambusa Wightii of Munro, from Courtallum, is a Teinostachyum.

OXYTENANTHERA. Munro.

Gen. Char. Spikelets subcylindric often elongate and curved, generally few-flowered, flowers 1-3, sometimes only 1, the terminal one or the last but one 2-paleaceous and fertile, rachilla obsolete, palea very much imbricate, lower palea many-nerved acuminate or spinoso-mucronate, margin glabrous or fimbriate, upper palea in the bipaleaceous fertile flowers convex on the back, keels obsolete in the other flowers bicarinate, scales none. Stamens 6 monadelphous, anthers apiculate with a mucro or bristle (often long) or with a few hairs. Style slender long or very long scarcely thickened at the base, divided at the apex into 2-3 sometimes long and plicate stigmas ; caryopsis narrow linear-oblong marked with a longitudinal furrow. Arborescent or scandent reeds, spikelets aggregated in dense verticels. *Munro Monogr. p.* 126.

This genus is distinguished from all others by its monadelphous stamens, absence of scales, and the convex not keeled upper palea of the fertile flower.

1. Oxytenanthera Thwaitesii, *Munro.*—Unarmed, a very straggling subscandent weak reed, culms 10-20 feet long, hollow, 1-1¼ inches in diameter, leaves lanceolate acuminate a little oblique, 2-12 inches long, ½-1½ inches broad, 6-12 nerved on each side the interstices prominently venulose, transverse venules obsolete or conspicuous, the sheaths with fugaceous white hairs and ciliate except in age. Spikelets short acute 4-6 lines long 3-5-6 flowered, 1-3 of which are fertile, densely glomerate, lower palea subulato-acute at the apex 15-20 nerved, margin glabrous or fimbriate, a little longer than the upper one, upper palea in the bipaleaceous fertile flower convex 9-nerved, ciliate on the margin, subpilose at the apex, in the other flowers 2-keeled, anthers narrow linear subulato-apiculate, the point pilose. Style long pilose, the apex only divided into 2-3 plumose stigmas, caryopsis 3 lines long linear-oblong acute at the apex and glabrous. *Munro Monogr. p.* 129. Dendrocalamus monadelphus, *Thw. En. p.* 376.

Very common on the Anamallays, 3500-6000 feet elevation, called Watte ; the hill men use the leaves for thatching ; it is also found in many other localities in and on the outskirts of moist woods along our Western Ghats, and is very common in the central parts of Ceylon at the same elevations. See Pl. cccxxii.

Analysis.

1. A spikelet (young.)
2. A spikelet after the stamens have protruded, showing the long stamen-tube exserted.
3. A portion of the same.
4. A glume.
5. A lower palea of a fertile flower.
6. A fertile floret the lower palea removed, shewing the convex-backed upper palea and the long stamen-tube surrounding the ovary and style.
7. A young bud opened, lower palea removed shewing that the stamen-tube is very short when young.
8. Stamen tube removed from the bud.
9. Stamen tube removed from a mature flower.
10. An anther, showing its hairy apiculation.
11. Ovary hirsute, style and 2 stigmas (I never found 3, which is the number it is generally described a having.) (All drawn from living specimens collected on the Anamallays at 4500 feet elevation.)

Covendo. del.

Dunphy Lith

Oxytenanthera Thwaitesii (Munro.)

see Manual under Bambuseæ.

Covarubias, del:

Dempsey. Lith:

Teinostachyum Wightii (Munro)

See Manual under Bambuseæ.

2. Oxytenanthera nigro-ciliata, *Büse.*—Arboreous, culms 30-40 feet, leaves 7-10 or even 12-15 inches long, 1¼-2 inches broad, lanceolate rounded at the base unequal sided, shortly petioled, rostrato-acuminate at the apex, glabrous above, scabrous at the margins, paler beneath, pubescent or at length glabrous, primary veins 8-12 on each side, not very conspicuous. Sheaths abruptly truncate, margin fimbriate or glabrous, generally glabrous sometimes adpressedly hirsute, panicles very large compound the ultimate branchlets slender verticellato-spicate sometimes foliaceous at the apex. Spikelets in verticels ½-2½ inches apart, few or numerous, cylindric, 9-14 lines long narrow often curved 5-7 flowered, the 2-3 lower florets unipaleaceous neuter, above which there are 1-3 bipaleaceous fertile florets, and a conspicuous terminal exserted unipaleaceous neuter floret, the lower palea of the fertile florets acuminate or rarely subobtuse nerved at the apex, the margins fimbriate with blackish or violet hairs, membranaceous at the base often pubescent on the back, the upper palea about the same length concave at the back the keels long-fimbriate obtuse or bimucronate at the apex, in the upper floret it is convex on the back, stamens 6, anthers with a long hirsute mucro, style long 3-cleft at the apex, ovary linear-oblong hirsute at the apex. *Munro. Monogr. p.* 128. Bambusa nigro-ciliata, *Büse. in Pl. Jungh.* i. 389. Bambusa bitung, *Hassk. Fl. Jav. Rar.* 42.

Coorg and Canara, also in Eastern Bengal, Chittagong, &c, Birmah, the Andamans, Java and Sumatra.

3. Oxytenanthera Stocksii, *Munro.*—Culms slender, internodes 4-7 inches long glabrous, the nodes with few branchlets, leaves linear-lanceolate mucronato-acute at the apex cordato-rotundate at the base or attenuated into a flat petiole, 3-4 inches long by 4-6 lines broad hirsute or glabrous above, hirsute beneath, primary veins 4 5 on each side inconspicuous, sheath striated often pubescent when young glabrous in age, mouth fimbriate, inflorescence as in No. 1, verticels sometimes 1¼ inches in diameter, very dense almost echinate, spikelets about 6 lines long terete very acute glabrous 4-5 flowered, the 2 lower florets unipaleaceous shining on the back mucronate at the apex, the 2 next bipaleaceous and fertile the upper one very short or obsolete, the lower palea membranaceous striato-nervose subulate with a long spine at the apex, margin glabrous, the upper palea in the 4th flower convex obtuse, in the third bicarinate obtuse, the keels fimbriate. Stamens 6 monadelphous shortly mucronate or nearly obtuse or apiculate with 1-2 greenish hairs. Style 2-3 cleft at the apex, ovary (young) hirsute at the apex. *Munro. Monogr. p.* 130.

Concan ghats. I have not seen this; its leaves are said to be exactly like those of Dendrocalamus strictus; it is distinguished from the last by the short points to the anthers and its striated membranous lower palea.

4. Oxytenanthera monostigma, *Bedd.*—A large unarmed reed, culms ? leaves 8-10 inches long by 1-1½ broad lanceolate rounded or somewhat attenuated at the base, setaceo-acuminate at the apex, glabrous except minute asperous recurved points at or near the margin (sensible to the touch but not visible without the lens), primary veins 6-8 on each side. Sheaths striated glabrous, inflorescence terminal in very closely approximated dense globular heads about 2 inches in diameter, spikelets very numerous perfectly glabrous about 1 inch long and very narrow, 2 flowered, viz. one empty palea above the 2 unequal glumes and 1 terminal bipaleaceous floret, lower palea very glabrous and shining with glabrous margins, apex much hardened and terminating in a long articulated in age deciduous spiny point, upper palea convex and perfectly glabrous shorter than the lower, stamens 6 monadelphous in a long tube, anthers with a prominent bristle hairy at its apex, squamulæ none, style and ovary perfectly glabrous, stigma entire terminating in a minute thickened point at its very apex, caryopsis narrow linear oblong, when ripe half as long as the upper palea in which it is closely folded.

Anamallays. It is at once distinguished from all the rest by the articulated very long spiny point to the lower palea of the terminal or fertile floret, the palea and glumes are perfectly glabrous even at their margins, and the style is glabrous with a simple stigma.

Another plant, which I have doubtfully under this genus in my Herbarium, is very similar to O. Thwaitesii, with exactly similar spikelets, but is either quite abnormal or else entirely a new genus; it has monadelphous stamens and no squamulæ, but the stamens are generally only 3, sometimes 4-5 never 6, and there are 3 long styles either quite free or twisted together, each with a bifid stigma; the ovary is long linear oblong.

SEC. III. BACCIFERÆ.

TEINOSTACHYUM. Munro.

Gen. Char. Spikelets many-flowered imperfect above and below, cylindric attenuated elongate 1-2½ inches long, rachillæ articulate often long and conspicuous, the lower 1-2, the upper 2-4 florets unipaleaceous incomplete, the intermediate fertile flowers 3-5, glumes 2-3 or many sometimes distant, the lower palea involute at the base, broad at the middle, attenuated at the apex, many-nerved, the upper palea shorter or longer 2-keeled, keels ciliate. Scales 3 sometimes concave at the base fimbriate or glabrous at the apex. Stamens 6 free at the base, anthers obtuse, style very long included in the beak of the ovary, at length exserted, the apex 2-3-fid, stigmas slender short revolute soon caducous, ovary with a very long attenuated beak, fruit bacciform rostrate. Arboreous or shrubby or subscandent, leaves lanceolate petioled without transverse venules, mouth of the sheath fimbriate, inflorescence in spikes or panicles. The elongated spikelets with several fertile flowers and the long joints of the rachilla distinguish this genus from all others of this section. *Munro. Monogr. p.* 142.

1. Teinostachyum Wightii, *Munro.*—A very large weak reed, culms subarboreous suberect, 12-20 feet high, leaves oblong or oblongo-lanceolate sparingly hairy underneath when young, at length glabrous on both sides, more or less scabrous at the margins with asperous recurved points, apex with a long scabrous almost setaceous acumination rounded or attenuated at the base into a 4-9 lines long flattish petiole, 10-20 inches long by 2-4¼ broad, primary veins rather prominent beneath, 6-15 on each side, transverse venules inconspicuous, sheaths glabrous striated, branches terminal very long and lax 1½-2 feet or more pendulous, branchlets very slender, spikelets much attenuated at the apex, very narrow cylindric 2-2¼ inches long with the rachillæ very long and slender, lower palea of the

fertile florets many-nerved hirsute on the back, upper palea a little longer obtuse convex on the back with the keels hirsute, scales 3 equa large ovate nervose fimbriate, stamens 6 free at the base, anthers obtuse, style long included in the glabrous beak of the perigynium, stigmas 2 at length exserted and revolute, ovary with a long beak, caryopsis glabrous with a short stalk and a very long beak. Bambusa Wightii, *Munro. Mongr. p.* 111.—See Plate cccxxiii.

Common on our western mountains up to 3-4000 feet elevation.

Analysis.

1. A spikelet.
2. A portion of the same, shewing a fertile floret and a neuter flower with its rachilla.
3. A fertile floret and the articulated rachilla, off which the neuter flower has dropped.
4. The nerved lower palea hispid down the back, the apex much acuminate.
5. A fertile floret, the lower palea removed to shew the upper obtuse palea convex on its back, the keels ciliate.
6. A fertile floret, both paleæ removed to shew the 6 free stamens and the 3 ovate fimbriate scales.
7. An anther.
8. Ovary and style, and the scales.
9. Mature fruit, showing the short stalk at its base. (All drawn from living species collected on the west slope of the Nilgiris, 1000 feet elevation.)

2. Teinostachyum attenuatum, *Thw.*—Culms 15-25 feet high, ½-1 inch in diameter, unarmed, leaves 3-6 inches long 4-9 lines broad nervoso-striate glabrous linear-lanceolate subabruptly acuminate, rounded at the base, petioled, the sheaths sparingly adpresso-pilose, flowering branches fasciculate rather short leafy, panicles simple spiciform, spikelets about 1 inch long glabrous subsessile congested in small fascicles narrow attenuato-cylindric 5-flowered, the 2 upper and the lowest flowers generally sterile, scales 3 lanceolate fimbriate at the apex, the lower palea 12-nerved glabrous acute mucronate a little longer than the upper one, the upper palea 2-keeled, the keels fimbriate above, style elongate thickened below the middle. Stigmas 3 plumose much shorter than the style, stamens 6 free the mucro of the anthers very small obtuse, fruit rostrate attenuate at both ends glabrous with the beak 4½ lines long. Bambusa attenuata, *Thw. En. Pl. p.* 375. Teinostachyum, *Munro.*

Ceylon, central provinces, 4000-6000 feet elevation.

BEESHA. Rheede.

Gen. Char. Spikelets imperfect at both ends, monœcious (always) cylindric many or few-flowered, the lower florets unipaleaceous and neuter, the penultimate one bipaleaceous and hermathrodite, the upper floret minute rudimentary or sometimes obsolete, glumes 2, the lower palea of the fertile flower many-nerved membranaceous glabrous or setose on the back, the upper palea generally longer obtuse or bimucronate at the apex. Scales 3-6-or numerous. Stamens 6-9 or very numerous, style long the apex divided into 3-4-5 stigmas. Fruit large ovoid or oblong acuminated with a long beak. Arboreous or shrubby, leaves large or small, inflorescence generally terminal either laxly verticellato-spicate or the spikelets congested in heads at the apex of the branches. *Rheede Hort. Mal.* v. 119. *t.* 60 ;—*Munro. Monogr. p.* 144. Ochlandra, *Thw. En. Pl. Zey.* 376.

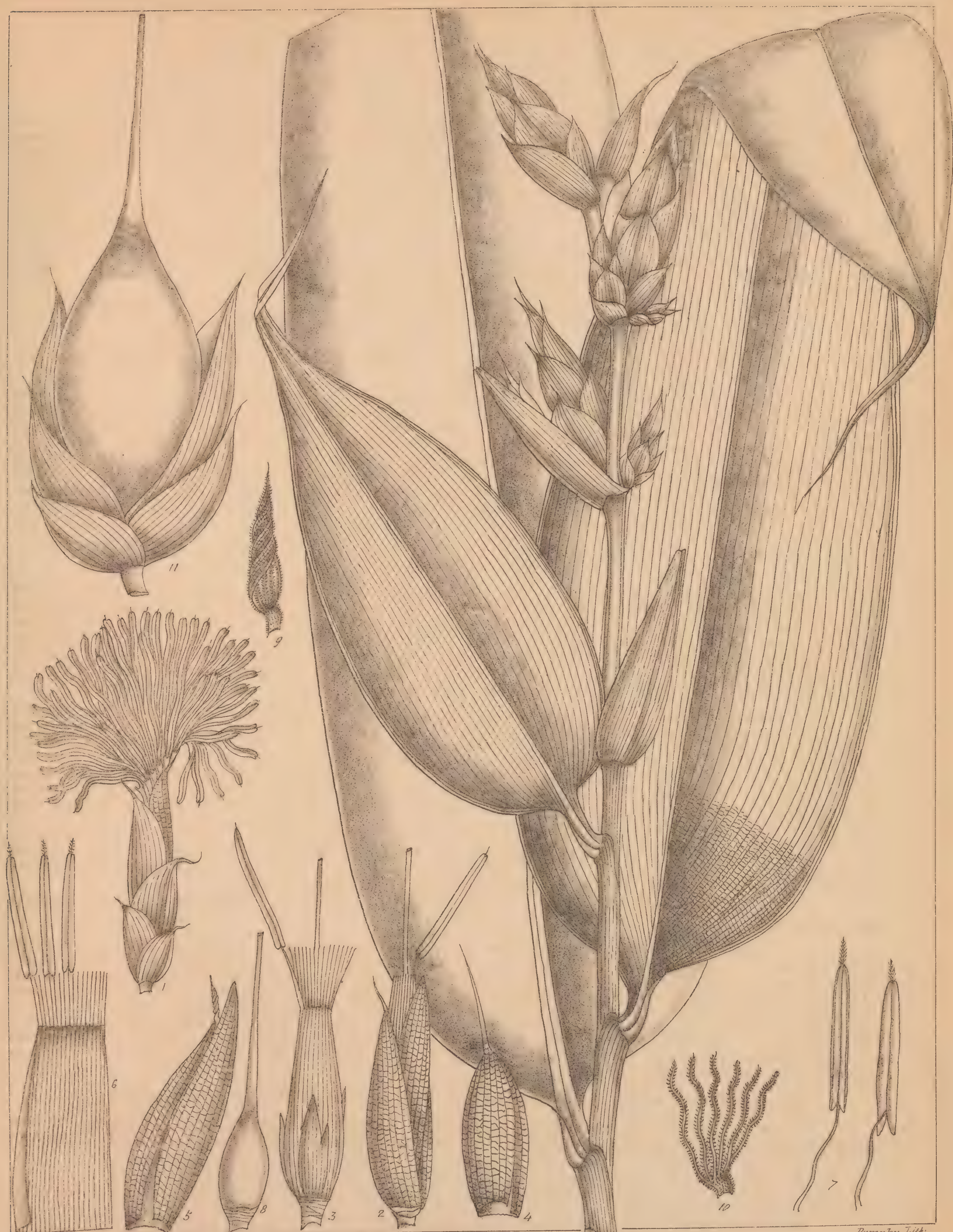
1. Beesha stridula, *Moon.*—Culms 6-18 feet high suberect crowded, internodes often scabrous, leaves broad-lanceolate 8-12 inches long by 1¼-1¾ inches broad rounded at the base and suddenly attenuated into a short petiole, setaceo-acuminate at the apex, glabrous or subglabrous except near the margin and there generally asperous on both sides or only on the upper side on the 3-4 outer nerves with minute recurved prickles sensible to the touch but not visible without a lens, the sheath hirsute glabrous in age, the margin ciliate often biauriculate, panicles laxly spicate terminal or on leaf-bearing branchlets 2-5 semi-verticellate from the joints, spikelets aggregated in small heads, fertile and sterile mixed, the fertile cylindric 1-1¼ inch long acute 3-5 flowered, the 1-2 inferior florets similar to the glumes but longer, the apex with a long mucro and the back furnished near the apex with deciduous white hairs, the penultimate floret fertile the lower palea very membranaceous at the base acute glabrous 30-nerved, the upper one equal in length obtuse convex on the back about 18 nerved. Scales 6-9 or more lanceolate 1-7-nerved. Stamens 7-30 equal free at the base, anthers mucronulate, style long included in the beak of the perigynium. Stigmas 4-5 very short plumose, fruit large ovoid beaked with the hardened persistent 1½-2 inches long style and surrounded with the palea and scales of the spikelet. Bambusa stridula, *Moon.* Ochlandra stridula, *Thw. En. Pl. Zey. p.* 376. Beesha, *Munro. Monogr. p.* 145.

Ceylon, very common about the low country in the south of the island, Badagam and elsewhere, called Batta ; the leaves make an excellent thatch.

2. Beesha Rheedii, *Kunth.*—Culms arborescent up to 16 feet high, leaves lineari-lanceolate 4-5 inches long by 6 lines broad, rounded at the base and petiolate, acuminate with a very long bristle, glabrous on both sides or scabrous at the margins, sheaths glabrous ciliate at the mouth, ligula very short, panicles verticellato-spicate at the apex, 1-2 or 4-5 inches long, rachis glabrous, verticels often imbricate naked or foliaceous at the base. Spikelets dimorphous, the fertile 1-1½ inch long subsolitary, the sterile cylindric about 9 lines long, the fertile 3-4 flowered, the lower 1-2 florets unipaleaceous sterile, the upper or very rarely the 2 upper hermathrodite, paleæ many nerved glabrous or hirsute membranaceous, the inferior suddenly mucronate, the upper subobtuse. Scales many narrow fimbriate at the apex ; stamens 15-18 free at the base, anthers with a long or short apiculation. Style long 3-4 cleft at the apex, stigmas plumose, fruit oblong large with a beak 1¾ inch long. *Kunth. En.* 434. Beesha, *Rheede. Hort. Mal.* v. 119 *t.* 60. Melocanna Rheedii, *Steud.* ;—*Munro. Monogr. p.* 144.

Malabar and Cochin, I have never found this species, and my description is entirely taken from Munro's *Monograph.*

3. Beesha ? Travancorica, *Bedd.*—An erect arboreous or shrubby reed, culms 6-8 feet or more high, leaves lanceolate or oblongo-lanceolate, 7-18 inches long by 2-4½ broad rounded at the base with a short rather concave petiole long setaceo-acuminate at the



Beesha Travancorica. J.Bedd

See Manual under Bambuseæ

Dendrocalamus strictus.

see Manual under Bambuseæ

apex, glabrous or subglabrous on both sides but the margins generally scabrous with minute prickly points, primary veins 12-17 on each side, tesellated, transverse venules prominent beneath, sheaths striated glabrous, the mouth generally ciliate when young but beardless in age, ligula short truncate, panicles verticellato-spicate, spikelets ovate or oblongo-ovate 2-2½ inches long quite glabrous or rather softly pubescent generally 4-flowered; the two upper florets hermathrodite, the two lower unipaleaceous, sterile, the outer palea many striated coriaceous or submembranaceous, the upper palea obtuse very membranaceous striated and with transverse venules. Stamens numerous 50-60 monadelphous at the base at first shortly so, but the tube soon lengthens, anthers with a hirsute apiculation. Style long, stigmas 6 small plumose spirally twisted closely enveloped in the apex of the upper palea very soon deciduous leaving the style with a truncate apex as it is thrust out from the upper palea. Scales 3 lanceolate unequal one of them generally bifid all very membranaceous, fruit oblong or ovate fleshy embraced by the palea about 1½ inches in diameter and 2-2¼ inches long with a hard beak about 2 inches long. here Irulia Travancorica, *Bedd. in Distrib.*

This magnificent species is most abundant on the South Travancore and South Tinnevelly mountains, 3000-5500 feet elevation, where it covers many miles of the mountains often to the entire exclusion of all other vegetation ; in open mountain tracts it generally only grows to 6-8 feet in height, but most close and impenetrable, elephants even not attempting to get through it ; inside sholas and their outskirts it grows to 15 feet high and is much more straggling. It is called Irul by all the natives, and by Europeans the Elephant grass ; its monadelphous stamens and curiously twisted stigmas seem to require its removal from Beesha, in which case my genus Irulia will stand good. Not having seen Beesha Rheedii, I prefer however at present to let this remain in Beesha. See Pl. cccxxiv.

Analysis.

1. A spikelet after the anthers of the upper flowers have burst forth.
2. A fertile floret with its lower and upper paleæ.
3. The same the 2 paleæ removed, 3 scales or squamulæ (one of them bifid), and the long stamen-tube, and the truncated style, the stigmas having fallen off.
4. The palea of one of the neuter flowers.
5. The upper palea of a fertile floret when only in bud, the stigmas artificially removed from its apex in which they are almost folded up.
6. Portion of a stamen tube.
7. Anthers with their apiculations.
8. Ovary and style.
9. Highly magnified views of the 6 plumose spirally twisted stigmas ; they are so closely twisted as to appear as one to the naked eye.
10. The same opened out artificially.
11. A fruit with its long hard beak. (Drawn from flowers in spirits.)

DENDROCALAMUS. Nees.

Gen. Char. Spikelets imperfect below only, or both in the upper and lower part, ovate or oblong or oval acute or obtuse few-or many-flowered, rachilla wanting, florets 1-2 inferior unipaleaceous, the next 2 or 3 or several bipaleaceous hermathrodite or female, the terminal one effete or altogether wanting, glumes 2-3 the upper one keeled and the keel ciliate, the lower palea many-nerved generally ventricose chartaceous or membranaceous often subulate or spinoso-mucronate at the apex, the back glabrous or hirsute or sericeous, the margin glabrous or ciliate, the upper palea narrower obtuse few-nerved, scales none. Stamens 6 free at the base, anthers obtuse or with a long hirsute mucro. Style long filiform included in the beak of the perigynium, stigma entire plumose or 2-3-cleft, ovary hirsute at the apex rostrate the beak persistent or caducous, fruit bacciform oblong hirsute at the apex generally rostrate or the beak sometimes deciduous. Aborescent or shrubby bamboos, always unarmed, leaves narrow or broad, inflorescence paniculate, spikelets congested in heads. *Nees in Linneæ* ix. 476 ;—*Munro Monogr. p.* 146.

This genus only differs from Bambusa in its fruit and in the absence of scales or squamulæ in the flower.

1. Dendrocalamus strictus, *Nees.*—Culms unarmed arboreous up to 40-50 feet high, nearly solid or with a very small cavity. Spathes striated yellowish very smooth inside, 8-10 inches long with an adpressed glabrous apiculation, internodes about a foot long, leaves lanceolate with a long apiculation rounded or rarely attenuate at the base, the petiole short or sometimes much elongated, 1½-12 inches long by ½-1½ inches broad, above asperous or hirsute, beneath hirsute or at length glabrous. Sheaths hirsute viscid or glabrous the mouth with a few caducous bristles or beardless, ligula short truncate, panicles branched, branchlets terete simple elongate never pendulous, spikelets in dense globular verticelled heads which are 1-2 inches in diameter and entirely surrounding the branches, ovate or oblong, 3-9 lines long generally very acute, 1-2 of the lower florets unipaleaceous, the 2-3 upper ones bipaleaceous and hermathrodite, the lower palea (of the fertile flower) ventricose subcoriaceous hirsute or pubescent or velvetty on the back, the apex subulate with a long spiny point, the upper palea narrower obtuse pubescent 2-keeled and concave at the back, keels ciliate, 2-4 nerved, (in the upper floret with a convex glabrous back.) Stamens 6, free, connective not produced (or terminating in a long mucro.) Style long hirsute. Stigma plumose entire, (or bifid ?) ovary rostrate hirsute at the apex, fruit bacciform 3-4 lines long ovate rostrate. *Nees. l. c.* Bambusa stricta, *Roxb. Fl. Ind.* ii. 193. Bambusa verticellata, *Rottler.* B. pubescens, *Lodd. et Lindl. in Penny. Cyc.* Nastus strictus, *Smith.*

This is the male Bamboo, with nearly solid stems, and much in use for spear-shafts, building purposes, and many other uses ; it is very general throughout this Presidency on the dry slopes of our mountains up to 3000 feet elevation, and is common in Bombay, Bengal and Birmah, but absent from Ceylon (except in a cultivated state), and it extends to Singapore and Java ; it flowers frequently, I believe every year, and does not die down after flowering. See Pl. cccxxv.

Analysis.

1. A spikelet in bud, one unipaleaceous neuter floret below, two fertile florets above.
2. The same at maturity, the stamens exserted, the lower of the 2 fertile flowers with a 2 keeled concave upper palea and the upper fertile floret with a convex glabrous upper palea.
3. The lower of the 2 fertile florets.
4. The lower palea many nerved, very hairy towards the apex, terminating in a long sharp spiny acumination.
5. The lower fertile floret with the lower palea removed to show the 2 keeled convex upper paleæ, its keels ciliate; the 6 free stamens and the style with an entire stigma (it is generally described as bifid, but in upwards of 20 florets dissected, I found it always entire.)
6. The upper fertile floret, lower palea removed to show that the upper palea is convex, and smooth (except just at its apex.)
7, 8. Anthers.
9. The stalked ovary, hairy style, and entire stigma, and one of the 6 free stamens.
10. Fruit nearly mature. (All drawn from living specimens collected on the eastern slopes of the Nilgiris.)

FINIS.

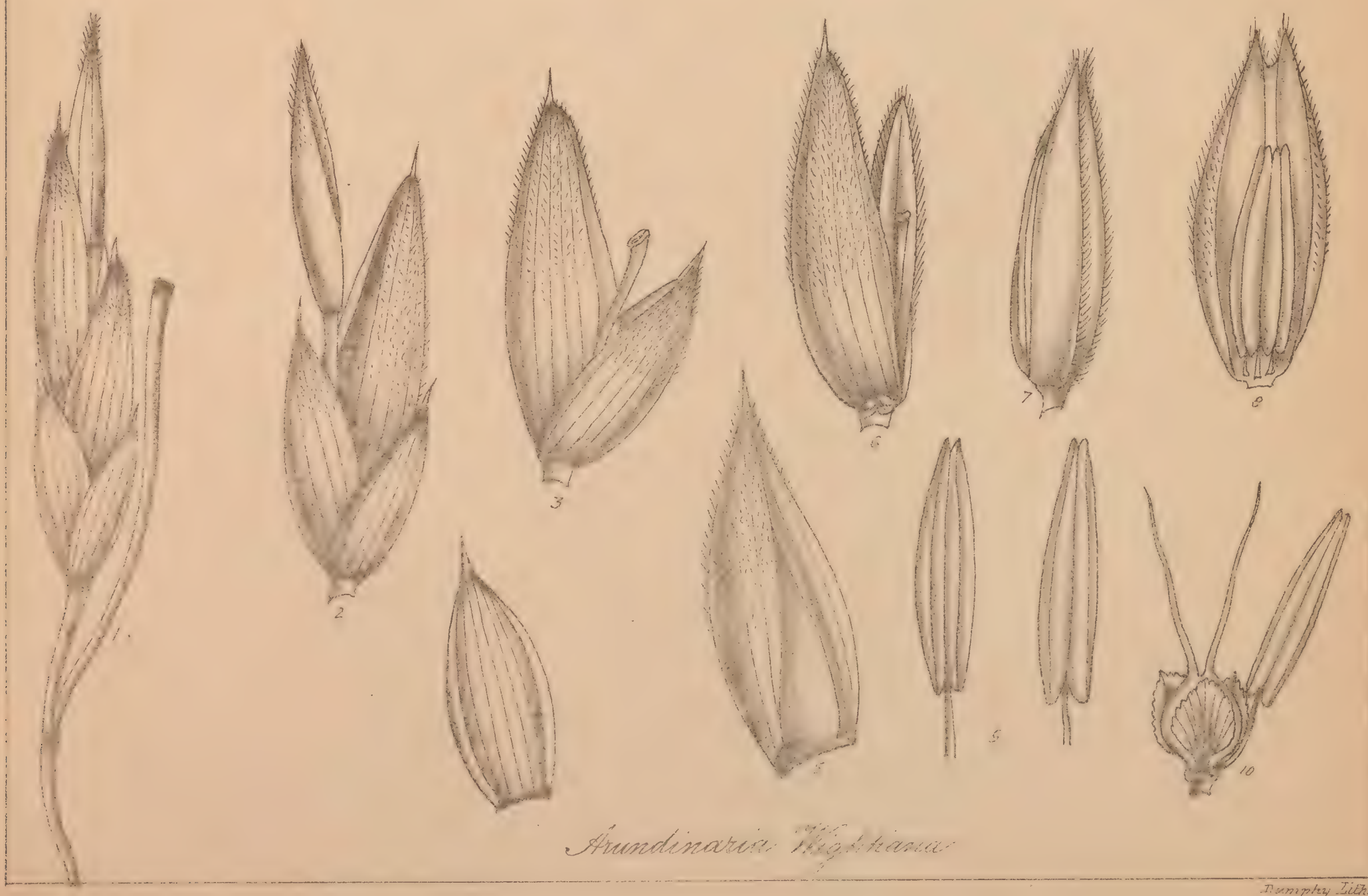
Analysis of Genera, Pl. XXVIII, fig. 1.

ASTERIASTIGMA MACROCARPA.

Male flowers—

1, 2, 3. Male flowers, front and back view, sepals 4, petals 16, 3 in front of each sepal and one alternate with each of the sepals, a thick 3-lobed scale in front of each petal and somewhat adnate at the base, stamens about 70 in 3 rows, rudiment of ovary 8-lobed.
4. A petal and some of the stamens removed from the flower to show that the latter are in 3 rows.
5, 6, 7. Views of one of the petals and the scale, the former much ciliate.
8, 9. Stamens, front and back view.
10. The abortive 8-lobed ovary. (Drawn from flowers in spirits. See Pl. cclxvi.)

Asteriastigma macrocarpa ♂ *See Pl: CCLXVI.*



Arundinaria Wightiana

Dumphry Lith:

ADDENDA ET CORRIGENDA.

Manual page viii. For Sageræa, *Dalz.*, read Bocagæa, *St. Hilaire*. (Sageræa is a synonym.)
For Sageræa Dalzellii and S. laurina, read Bocagæa Dalzellii (they are both the same species.)
For S. Thwaitesii, read Bocagæa Thwaitesii.
For Popowia ramosissima, read Popowia Beddomeana *(H. f. et T.)*

" x. Under Polyalthia enter

12. Polyalthia rufescens, *H. f. et T.*—A tree, young branches densely tomentose, leaves subsessile narrow oblong acute or acuminate, base obliquely cordate glabrous except on the midrib beneath, 3-7 inches long by 1-1¾ inch broad shining above pale below, peduncles ½-1 inch long stout tomentose solitary often leaf-opposed jointed, and minutely bracteate at the base, flowers ½-⅔ inch in diameter brown tomentose. Sepals small broadly ovate acute, petals oblong subacute thick, outer twice? as big as the inner, ovaries densely silky. *Flora of Brit. Ind. p.* 66.

Cochin (Wight). I have never seen this tree.

" xi. Orophea coriacea, *Thw.*, and O. obliqua, *Thw.*, are both species of Bocagæa.

" xv. Hooker says that Scolopia Wightiana is an Aporosa (Euphorbiaceæ). I have not seen it.

" xvi. Before Aberia enter

XYLOSMA. Forster.

Gen. Char. Same as Flacourtia, but ovary with 2 rarely 3-6 few-ovuled parietal placentas, and usually entire very short style, capitate stigma and globose 2-8 seeded berry.

1. Xylosma latifolium, *H. f. et T.*—A large thorny tree, young shoots finely downy, leaves broadly elliptic-oblong obtuse or acute obtusely serrate or subentire, 2-5 inches long by 1-2½ inches broad, hardly coriaceous, veins 4-5 on each side very oblique the 2 lower running nearly through the blade, petioles ⅓-½ inch long pubescent. Male flowers in small branched slender pubescent few flowered ½ to 1 inch long panicles, bracts linear oblong. Sepals minute orbicular ciliate, fruit about ⅙ inch in diameter with 4 placentas. Style very distinct. Stigma capitate 4-lobed.

Bababooden Hills, Mysore.

" xvii. Under Pittosporum enter

4. Pittosporum dasycaulon, *Miquel.*—A small tree or shrub, branches densely tomentose, leaves lanceolate or oblong-lanceolate glabrous, or the midrib beneath downy, 2½-4 inches long by 1-1½ inches broad pale green when dry thin coriaceous, margin-subundulate, young petioles tomentose, flowers white in dense much branched terminal compound tomentose corymbs. Sepals ciliate, ovate acute, anthers bright yellow. Capsule large compressed densely tomentose before dehiscence, about 6-seeded; flowers much larger than in floribundum. *Flora of British Ind. p.* 199.

Canara, Concan, Belgaum.

5. Pittosporum Ceylanicum, *Wight.*—A small tree, branches leafy glabrous, leaves narrow-obovate obtuse or subacute, base tapering, 3-4 inches long by ¾-1¼ inches broad, turning black in drying; petiole ¼-½ inch long, flowers ½ inch long greenish-white in terminal peduncled or compound corymbs, peduncles several 2-3 inches long glabrous, bracteoles small ovate at the base of the pedicels, sepals ovate acute subciliate, ovary pubescent, style glabrous, capsule globose, compressed 2-valved. *Wight. Ill.* 173;—*Flora British Ind.* 199.

Ceylon, 3-5000 feet elevation. (Distinct from No. 1, under which I had placed it as a synonym.)

" xxvii. After Monoporandra enter

BALANOCARPUS. Bedd.

Gen. Char. Tube of the flowering calyx very short adnate to the torus, segments imbricate in 2 series, in fruit erect and enlarging and forming a hard woody 5-lobed cup but not expanding into wings, petals entire or erose at the apex. Stamens 15 alternately single and double (as in Hopea) attached to the base of the petals, anthers oblong terminating in a very long bristle or awn, filaments broad at the base apiculate below the

anther ; ovary 3-celled, cells 2-ovuled, ovules collateral attached to nearly the centre of the partition, style short terete, stigma minute entire. Nut oblong or subglobose with a hard sharp point at the apex, hard and almost woody, seed erect, cotyledons very thick fleshy unequal, the larger irregularly 2-3-lobed, radicle prominent exposed in a linear cavity. Large trees, yielding hard durable timber, stipules inconspicuous and early deciduous, leaves entire coriaceous penniveined and reticulately venose, flowers as in Hopea.

1. BALANOCARPUS EROSA, *Bedd.*—A large tree, glabrous, leaves oblong obtuse and emarginate or scarcely acute at the apex, rounded or subcordate (often unequally) at the base, glabrous, shining above, 4-7 inches long by 1¼-2¼ broad, petioles 2-3 lines long much thickened, panicles glabrous or very minutely puberulous few flowered several together in the axils shorter than the leaves, bracts and bracteoles small somewhat persistent, flowers about 3 lines long; calyx slightly puberulous on the outside, petals erosely bifid at the apex silky with long white hairs on the outside glabrous within, nut oblong pointed 16-17 lines in length 9 lines in breadth, fruiting calyx segments truncated, smooth or subtuberculate.

Tinnevelly mountains, 2000-3000 feet elevation.

Plate cccxxix.

Analysis.

1. A flower bud.
2. Full flower, calyx slightly puberulous, petals with long hairs.
3. Calyx.
4. Corol opened out, petals erose at the apex, stamens 15 in 10 rows alternately single and double (as in Hopea.)
5, 6. Stamens.
7. Ovary cut vertically, ovules attached to centre of axis.
8. Ovary cut transversely 3 cells each 2-ovuled.
9. Branch in fruit.
10. A ripe fruit, a hard woody nut, seated in the enlarged woody calyx.
11. The calyx.
12. The seed removed, the radicle exposed on the outside of the cotyledons.
13. The radicle removed, side view.
14. The seed seen from the side opposite to the radicle, the larger cotyledon split into 3 lobes.
15. A seed just after germination has commenced, showing the fleshy cotyledons and the radicle.

2. BALANOCARPUS UTILIS, *Bedd.*—A lofty tree, young branches hoary, leaves lanceolate attenuate at the base obtuse or subacute at the apex glabrous 5-6 inches long by 1¼-1½ inch broad, petioles 6-8 lines long, panicles hoary with a minute soft silky pubescence solitary or several together in the axils shorter than the leaves, bracts and bracteoles minute very early caducous, flowers secund about 2 lines long, calyx and corol hoary on the outside, petals oblong obtuse crenated towards the apex, nut subglobose pointed about ½ an inch each way shining and generally covered with a gummy resin ; fruiting calyx segments subacute very tuberculate below.

Tinnevelly hills, south of Courtallum, 1000-3000 feet elevation, called Kara kong ; yields a very valuable timber very similar to that of Hopea parviflora. When in flower only it is scarcely distinguishable from the long leaved variety of Hopea parviflora which grows in the same localities.

Plate cccxxx.

Analysis.

1, 2. Flower buds, calyx and corol hoary with very short silky pubescence.
3. Calyx.
4. Corol opened out, stamens 15 in 10 rows alternately single and double (as in Hopea.)
5. One of the oblong obtuse petals crenate towards the apex.
6, 7. Stamens, filaments broad and flat at the base apiculate at the apex, anthers oblong with a long terminal hair-like bristle.
8. Ovary cut vertically, ovules attached to centre of axis.
9. Ovary cut transversely, 3 cells each 2-ovuled.
10. Branch in fruit.
11, 12. The fruit, a subglobose hard woody nut, seated in the enlarged hard woody tuberculate calyx.
13. A nut broken open, shewing the seed, the radicle exposed outside the cotyledons.

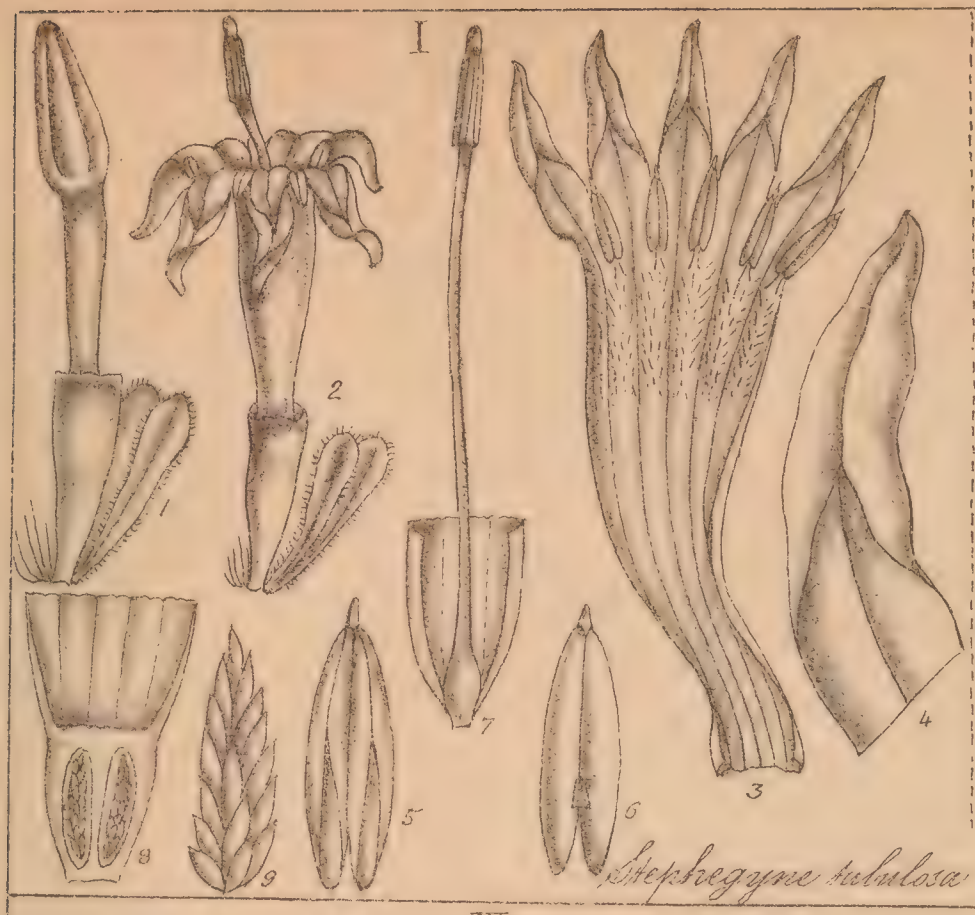
Manual page lv. Under Aglaia add

2. AGLAIA MINUTIFLORA, *Wight.*—A good sized tree densely covered with stellate down, leaves unequally or rarely equally pinnate up to more than 2 feet long by 1 foot broad, leaflets 4-6 pair, in age glabrous above except the costa, densely stellato-downy underneath, oblong to lanceolate with a long fine acumination, slightly and irregularly toothed or subentire, 3-6 inches long by 1-2 broad, primary veins prominent 10-14 on each side, male panicles axillary very large and very compound, from much shorter to about as long as the leaves, flowers very numerous very minute ½ a line in diameter, stamens 5 exserted beyond the nearly entire staminal tube, calyx hairy, petals glabrous, fruit densely stellate downy about 1 inch in diameter. Aglaia polyantha, *Bedd. in distrib.* Aglaia minutiflora, *Wight. Bedd. Icones tab.* cxciii.

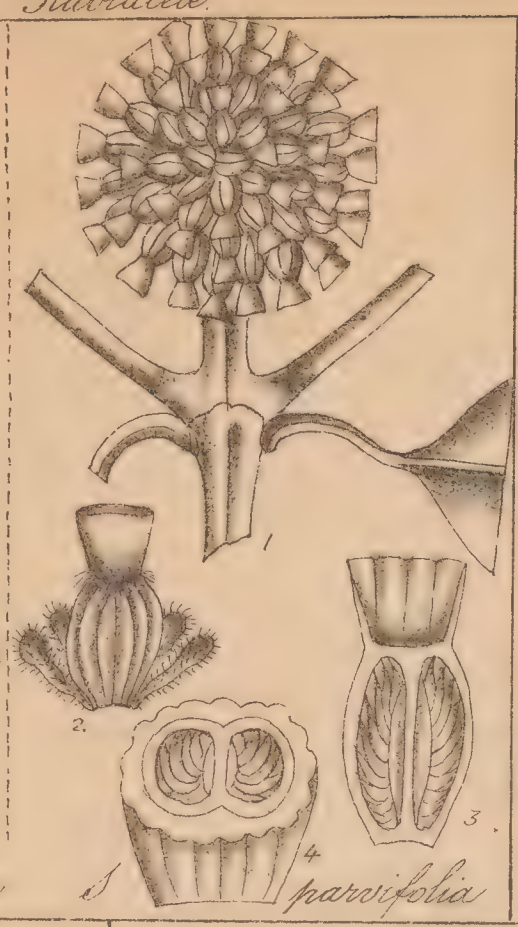
Travancore hills, 2-3500 feet elevation, Assambu hills, South Travancore, and Peermede, North Travancore.

Rubiaceæ.

I

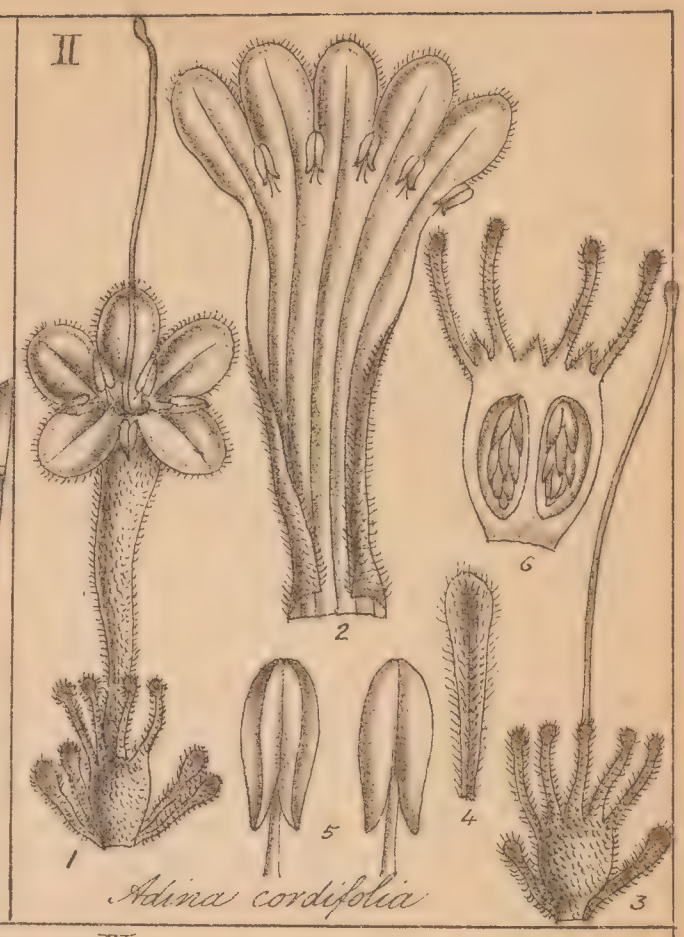


Stephegyne tubulosa



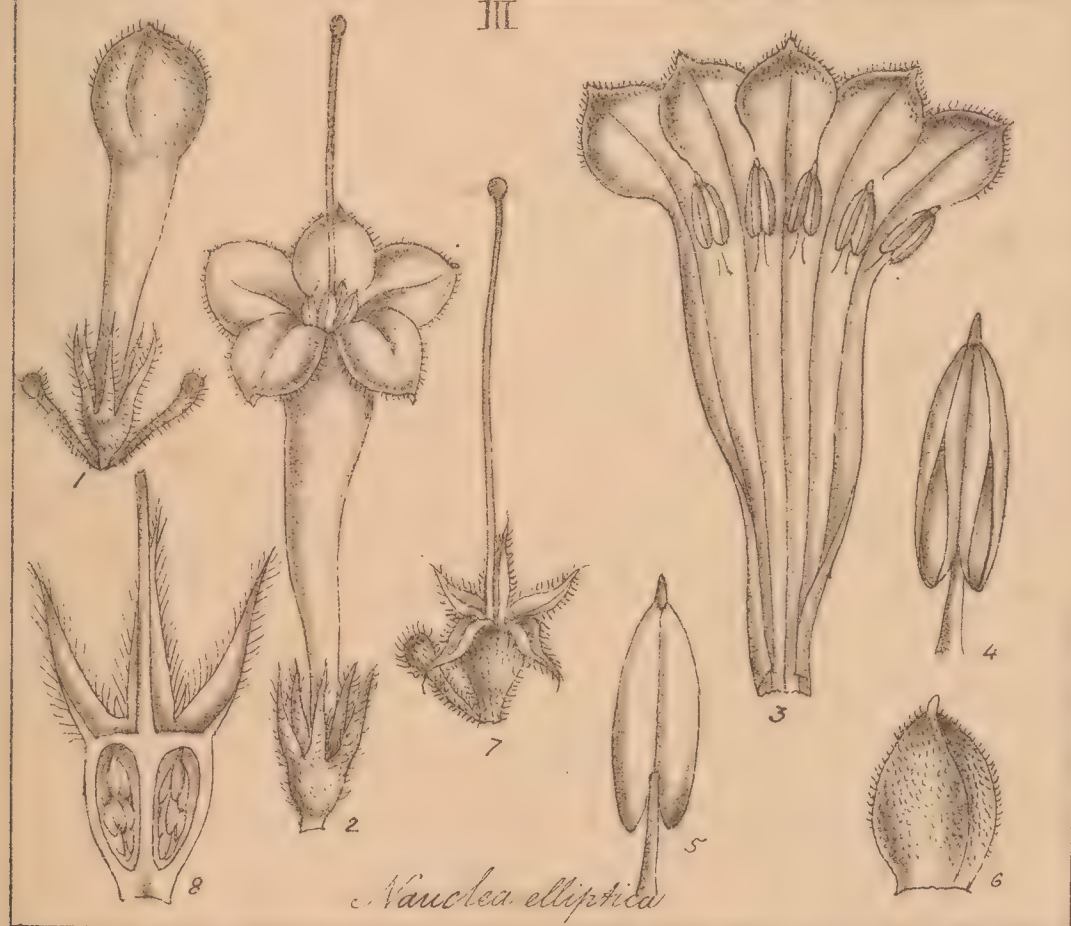
parvifolia

II



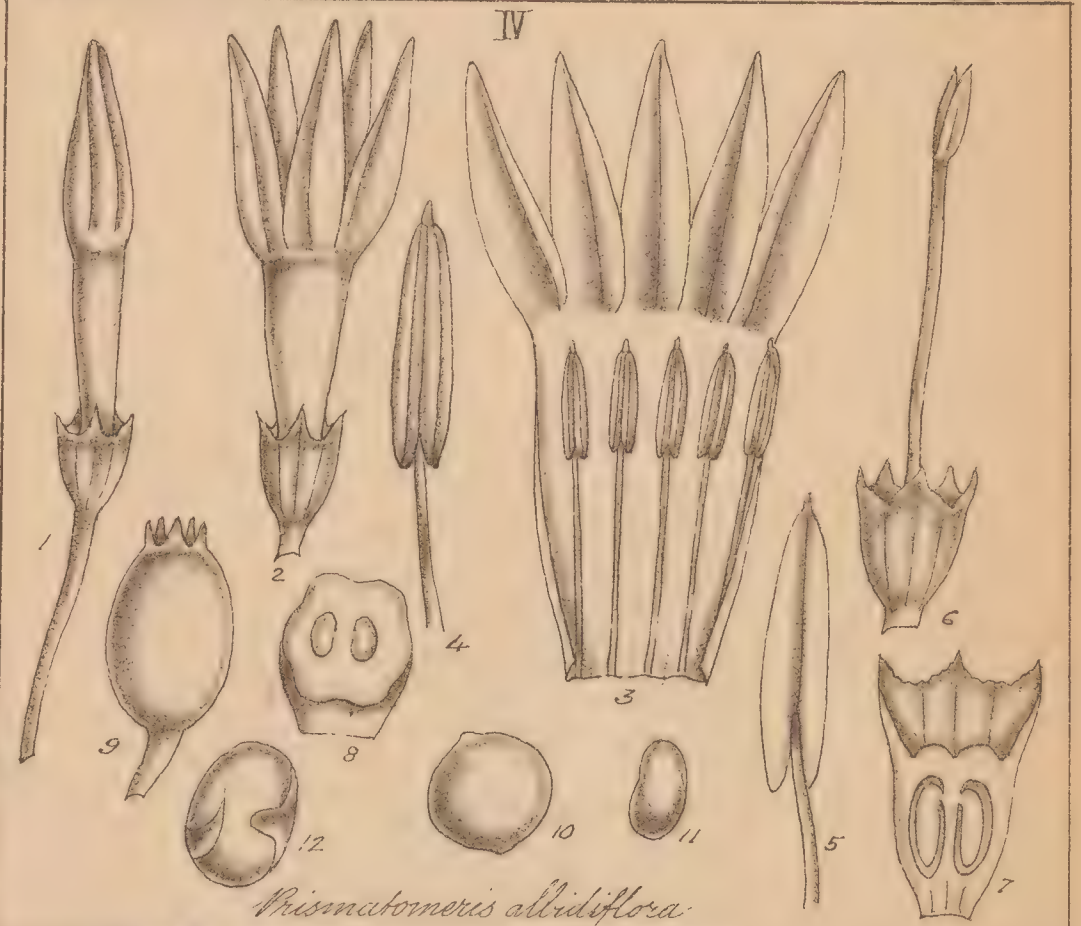
Adina cordifolia

III



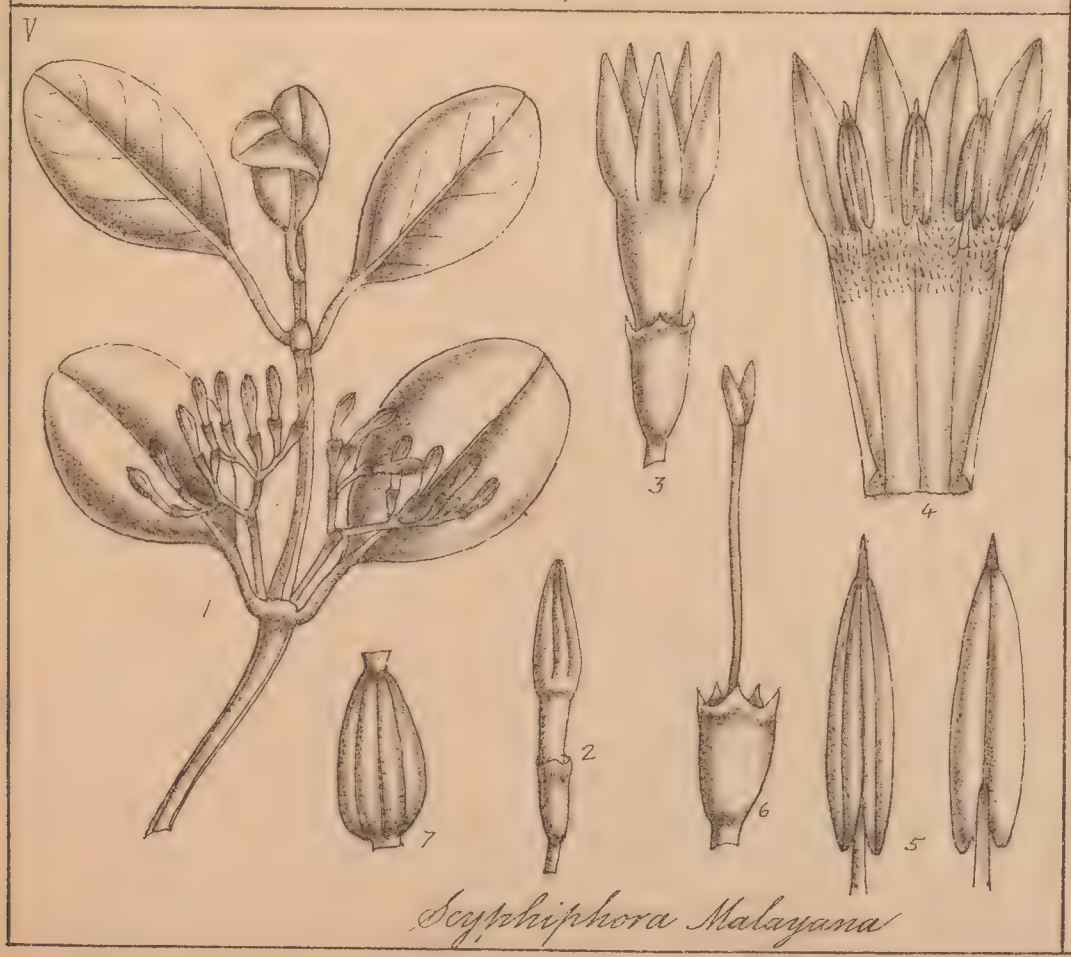
Vanclea elliptica

IV



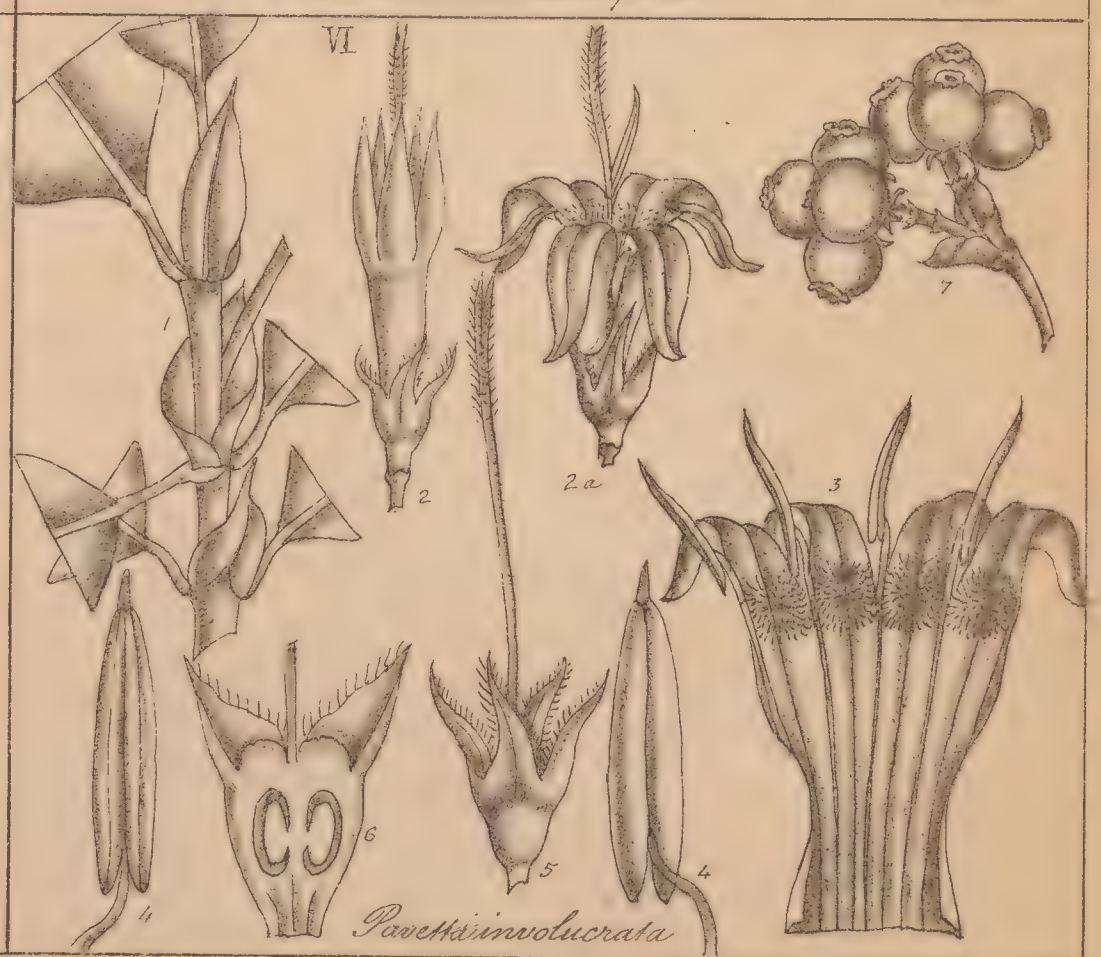
Prismatomeris albidiflora

V



Scyphiphora Malayana

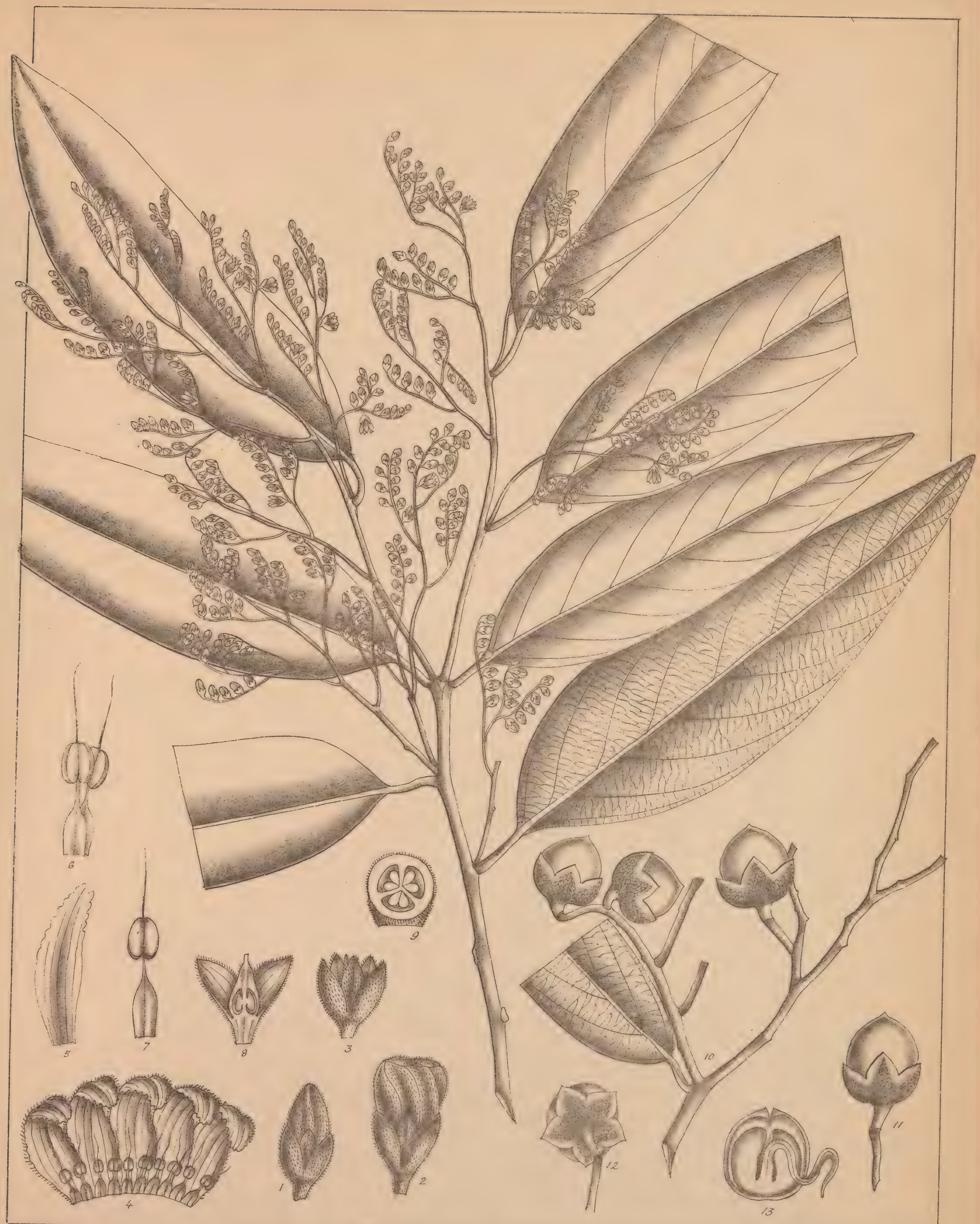
VI



Pavetta involucrata

Balanocarpus crosa (Bedd.)

see Addenda to Manual.



Govinds del

Dunphy Lith:

Balanocarpus utilis (Bedd.)

See Addenda to Manual

Manual page lxvii. TROCHISANDRA, *Bedd.*—This genus is not distinct from Kurrimia.

,, lxxii. Omit Anomosanthes, it being Hemigyrosa deficiens, figured in Plate ccxxxi.

,, xcvii. Under Parinarium add

2. PARINARIUM TRAVANCORICUM, *Bedd.*—A small very graceful tree, young parts with silky adpressed greyish white pubescence, leaves membranaceous or submembranaceous lanceolate or linear lanceolate with a generally bluntish acumen entire glabrous in age except the costa beneath which is often silky, 4-5 inches long by 1-1¼ broad, furnished with 2 inconspicuous glands at the base of the lamina beneath, primary veins numerous, veinlets much reticulated and prominent beneath, petioles 2-3 lines long. Stipules 4-5 lines long linear-lanceolate silky deciduous, racemes terminal simple or cymosely branched 3-4 inches long silky pubescent furnished with numerous lanceolate or linear-lanceolate bracts, calyx-segments ribbed down the back acuminate or acute, petals oval or oblong glabrous veined. Stamens 12-10 unilateral quite free at the base, filaments twice as long as the calyx-tube, ovary hirsute 2-locellate. *Bedd. Icones tab.* clxxxix.

I have only found this very graceful tree on the Travancore mountains about 2000 feet elevation, near the Rosemallay Coffee Estates not far from Courtallum; it is allied to P. Indicum, but more pubescent and with much smaller narrower leaves.

,, cxxiv. Omit Dichilanthe as it is now placed under Rubiaceæ (vide that order.)

,, cxxxv. The genus Monosis is now included under Vernonia.

,, cxliii. For Diospyros exculpta, *Ham*, read D. Tupru, *Buch.*

For Diospyros Wightiana, *DC.*, read D. melanoxylon, *Roxb.*

For Diospyros calycina, *Bedd*, read D. foliolosa, *Wall.* (add the first names as synonyms.)

,, cxliv. Omit D. nigricans as it appears to be only a form of D. ebenum.

,, cxlv. For D. microphylla, *Bedd*, read D. buxifolia, *Bl.* (the former name becomes a synonym.)

,, cxlvi. Omit Diospyros obovata, *Wight*, as it is only a form of Bassia Wightiana.

,, cxlvii. Omit the genus Macreightea; it is now incorporated in Maba: the 3 species become

Maba oblongifolia.

,, ovalifolia.

,, acuminata.

Omit the genus Holochilus as it is now incorporated in Maba: the species becomes Maba micrantha.

,, ccxiii. For Blackia read Blachia.

N. B.—A few errors in the nomenclature of the Plates have been altered in both the Alphabetical Index to the Plates and in the Index arranged according to Natural Orders.

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(The Italics are Synonyms.)

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